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NATIONAL DAM SAFETY PROGRAM. BROOKSIDE RESERVOIR (INVENTORY NUM--ETC(U)
JUL 79 J B STETSON DACW51-78-C-0035

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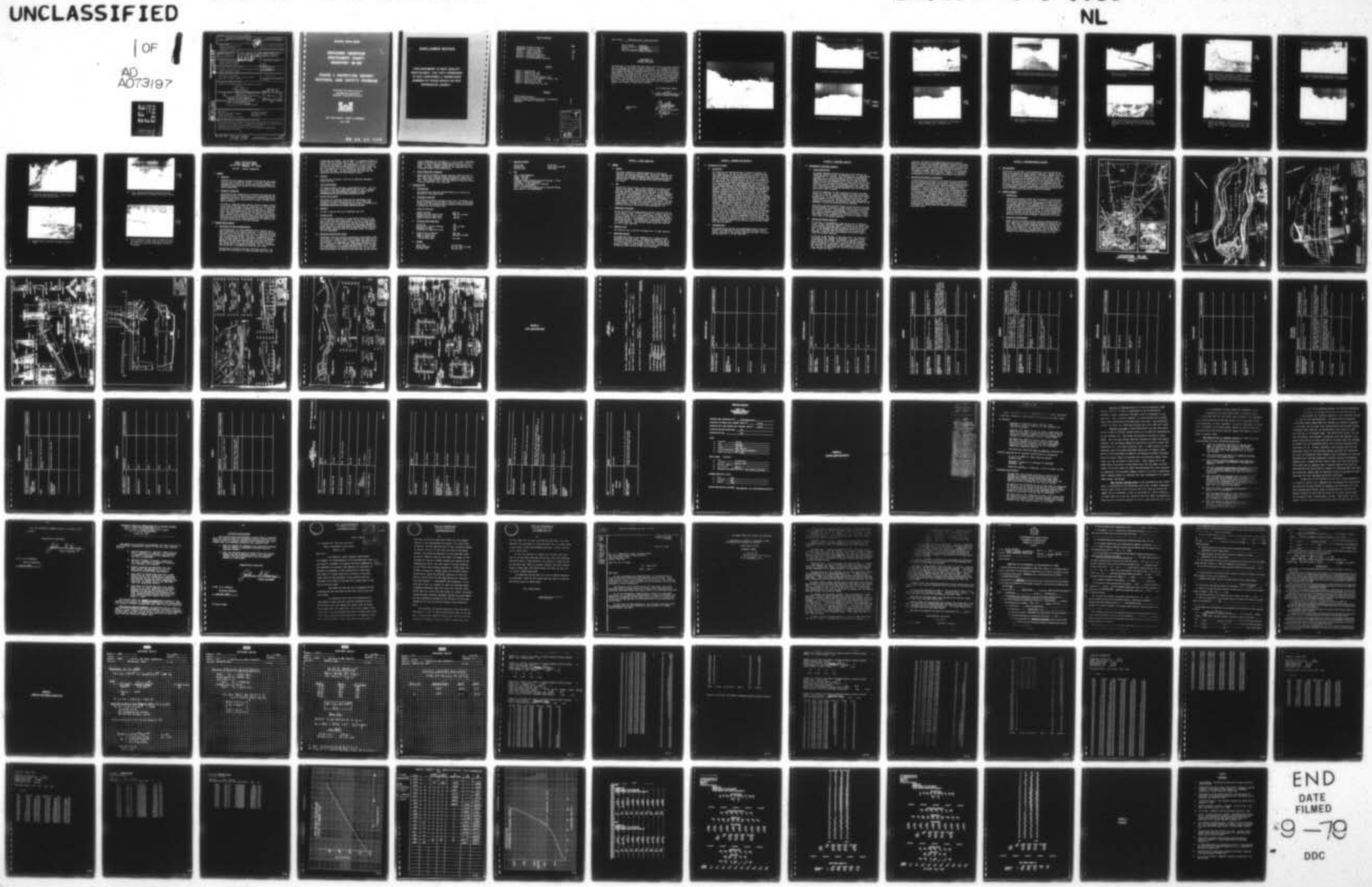

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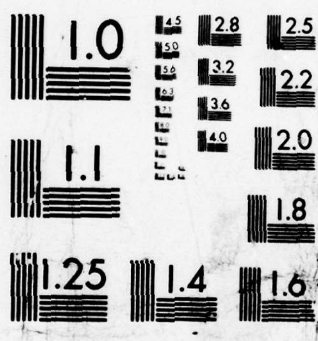
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READ INSTRUCTIONS BEFORE COMPLETING FORM

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Brookside Reservoir
Mohawk River Basin, Montgomery County, New York
Inventory No. N.Y. 168

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Phase I Inspection Report
National Dam Safety Program

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7. AUTHOR(s)
10 John B. Stetson

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Utica, New York 13501

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River Basin, Montgomery County.
Phase I Inspection Report.

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)
Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
Brookside Reservoir
Montgomery County
Bunn Creek

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.
Brookside Reservoir was judged to be safe, although some maintenance recommendations were made.

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MOHAWK RIVER BASIN

BROOKSIDE RESERVOIR
MONTGOMERY COUNTY
INVENTORY Nº 168

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED

CONTRACT NO. DACW 51-78-C-0035

NEW YORK DISTRICT CORPS OF ENGINEERS

JULY 1978

TABLE OF CONTENTS

FIGURES

APPENDIX

Name of Dam Brookside, City of Amsterdam NY163

State Located New York
County Located Montgomery
Stream Bunn Creek
Date of Inspection June 16, 1978

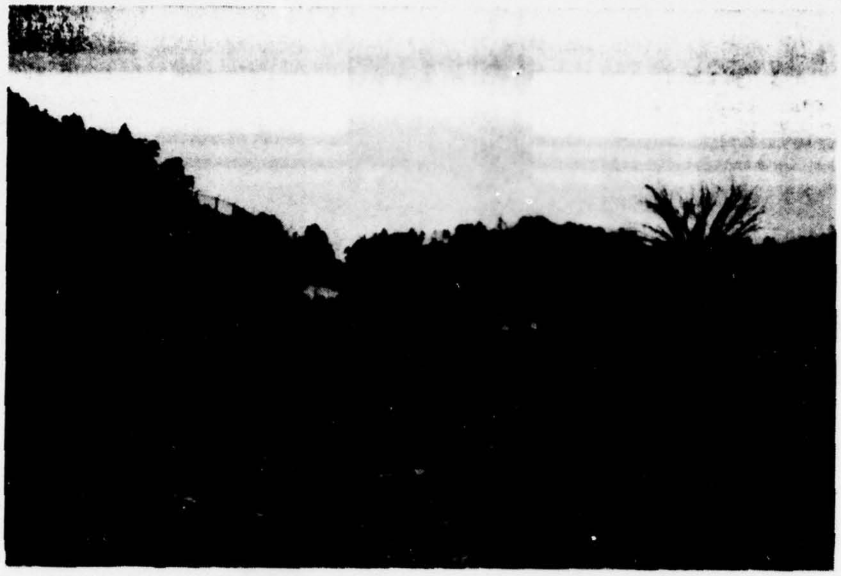
ASSESSMENT OF GENERAL CONDITIONS

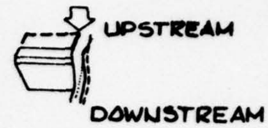
The Brookside is an earthen dam water supply distribution reservoir structure which is adequate for normal reservoir operation. The spillway will pass a 1/2 Probable Maximum Flood provided that the diversions channels do not become clogged with debris, otherwise the dam is in danger of being overtopped. Subsequently, care should be taken to assure that the entrance to the diversion channels is maintained at all times. The embankment of the dam should be kept cleared of brush and trees so that it can be adequately inspected in the future. Maintenance of the slopes apparently does not have a high priority. A number of animal holes and a dead tree should be attended to, in addition to a number of other minor problems.

Dale Engineering Company

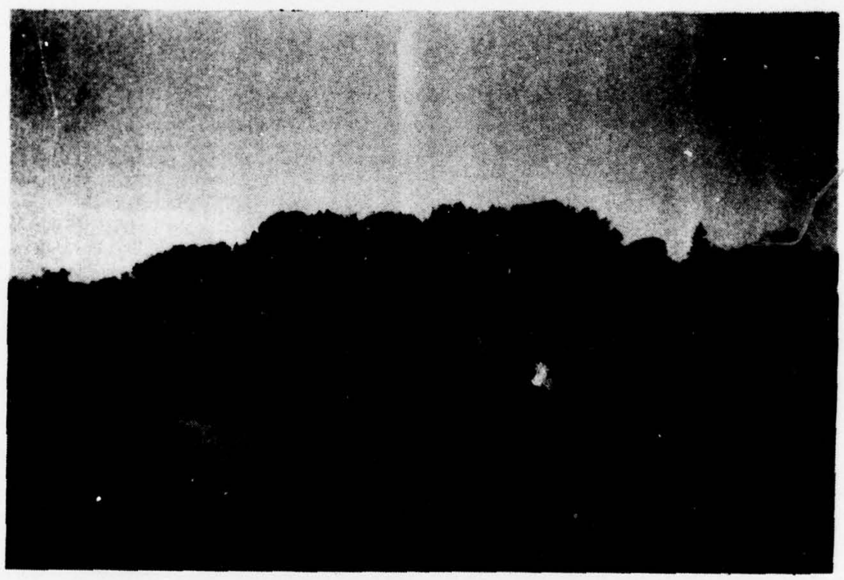
John B. Stetson
John B. Stetson, President

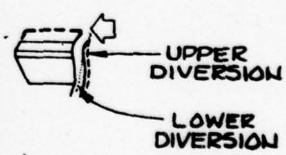
Clark H. Benn
Approved By: Col. Clark H. Benn
New York District Engineer
Date: 28 July 78





1. View of spillway looking south.



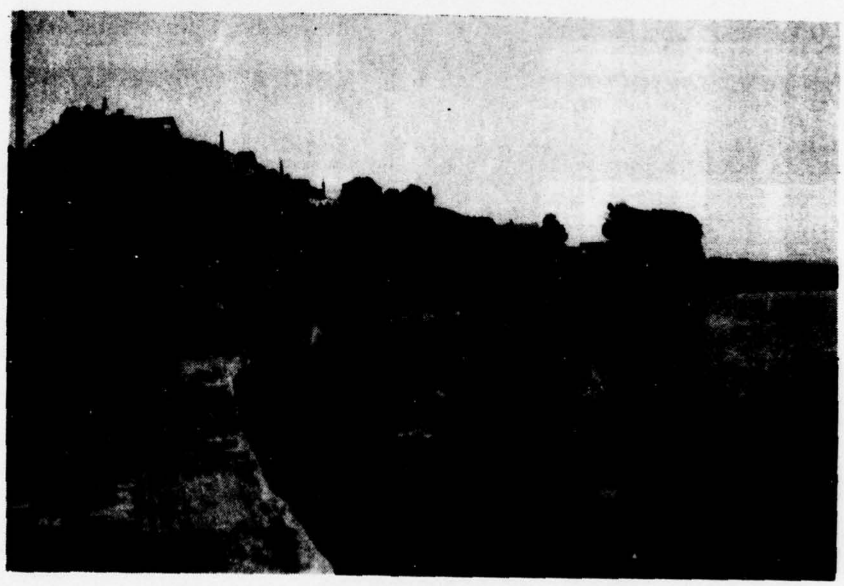


2. View across front of reservoir.

3. View of west overbank area.

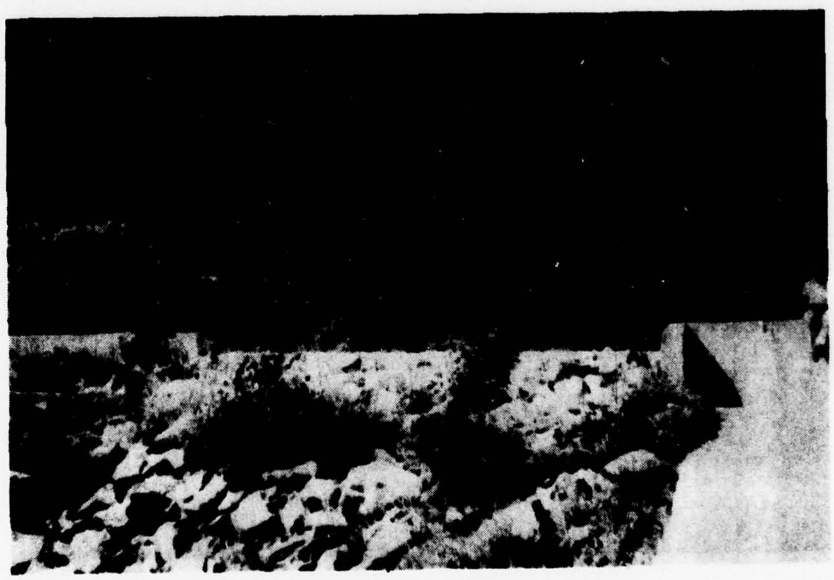
4. View looking north towards city filtration plant showing east overbank area.

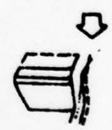
5. View looking north along east side of reservoir atop lower diversion box culvert.



6. View looking south along lower diversion box culvert.

7. View of reservoir and access road from filtration plant.

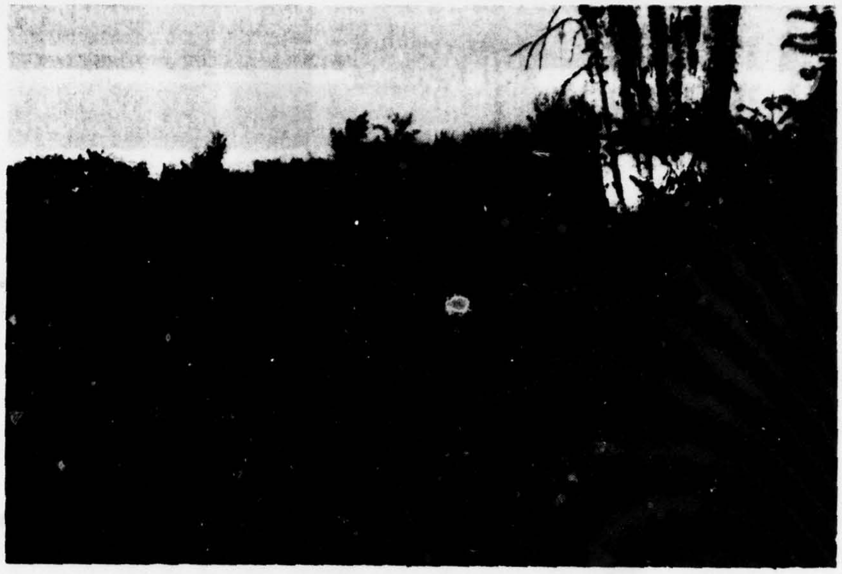


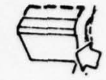


8. Lower diversion box culvert overflow weir. Reservoir is immediately below riprap area. See photo 16 for view of outlet in spillway area.

9. Upper diversion structure. Original diversion pipe (still in use) and weir. (See photo 15 for view of outlet in spillway area.) Upstream view of flood pool retention area.

10. Detail of riprap. Section of dam may have been constructed for ice harvesting. May be an area of minor sloughing on upstream face.



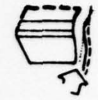


11. View of downstream embankment from spillway wall. Notice large dead tree in embankment.

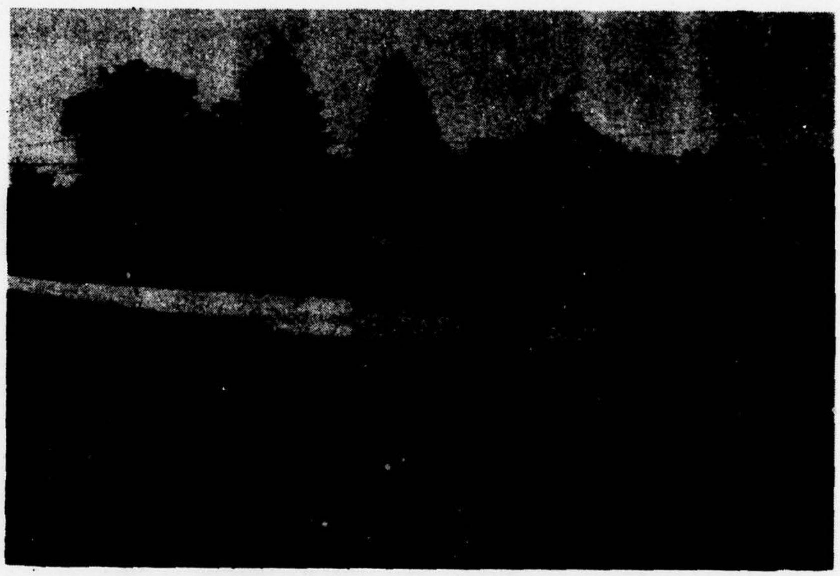
12. Overview of downstream embankment above pump house.

13. Drop area below spillway. Notice drain pipes through masonry wall.

14. Downstream of spillway channel founded on rock.



15. View looking upstream towards spillway. Pipe above wall for upper diversion flows.



16. View looking at east face of spillway wall at entrance of lower diversion box culvert. Wet area in piccture from upper diversion discharge.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM - BROOKSIDE ID# - NY168

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and The New York State Department of Environmental Conservation.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the structural and hydraulic condition of the Brookside (City of Amsterdam) Dam and appurtenant structures, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the State of New York.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Brookside Dam is an earth embankment with a concrete cap on what is believed to be a masonry core wall. No definite record of the material of the core wall could be found. References are made both to a masonry and concrete core wall. The height of the structure is approximately 50 feet. The length is approximatley 500 feet. The exact length of the structure is difficult to determine because of the many reconstructions that have taken place during the life of the facility. The top width of the dam is 15 feet. The upstream face is riprapped at the water line. The downstream face of the dam is overgrown with brush and small trees.

The spillway is located to the east of the main structure. The spillway is 78 feet wide at its mouth and necks down to 62 feet

further down the channel. The spillway is a rectangular channel of concrete that was reconstructed in 1965. Two bypass structures are connect into the spillway. See photographs 5, 6, 8, 9, 15 and 16. The spillway discharges to Bunn Creek which is formed in bedrock and flows through the City of Amsterdam to Chuctanunda Creek. The dam is equipped with a 14 inch outlet pipe drain which allows draining of the pond. The pipe discharges into Bunn Creek just downstream from the end of the principal spillway.

b. Location

Brookside dam is located in the City of Amsterdam, Montgomery County, New York.

c. Size Classification

The maximum height of the dam is approximately 50 feet. The storage volume of the dam is approximately 306 acre feet. Therefore, the dam is in the intermediate size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

Bunn Creek, the receiving stream from the impoundment, flows through heavily developed portions of the City of Amsterdam. Therefore, the dam is in the high hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the City of Amsterdam, New York.

f. Purpose of Dam

The dam presently functions as a distribution reservoir for the City of Amsterdam Water Supply System. As such, the dam impoundment carries only the treated water from the City's Water Filtration Plant which is located just to the north of the impoundment. The normal flows of Bunn Creek bypass the impoundment through two bypass conduits and discharge part way down the spillway structure. During normal operation, none of the surface runoff is conducted into the impoundment.

g. Design and Construction History

The Brookside Dam was originally constructed in approximately 1882. Since that time, numerous construction programs have taken place at the structure. In June of 1917, a heavy runoff overtopped the dam and portions of the embankment were washed away exposing the core wall. Subsequent to this incident, an enlargement of the spillway and reconstruction of the earthen embankment took place. In 1925, plans were prepared for reconstruction of the dam. At that time, the top elevation of the dam was raised above the core wall and the

upstream embankment was flattened to a 1 on 2.5 slope. Downstream slopes on the dam were also changed and constructed to a 1 on 1.5 slope. In 1965, a complete reconstruction of the spillway took place. The bypass channels adjacent to the impoundment were also reinforced as part of this construction.

h. Normal Operational Procedures

Normal operating procedure includes routinely checking blowoff or drain down valve in the gate house, maintenance of slopes and riprap. Excess flows normally discharge through the diversion conduits. The reservoir site is also the location of the city filtration plant which has a full time staff.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area above the Brookside Reservoir in the City of Amsterdam is 4.08 square miles.

b. Discharge at Dam Site

No discharge records are available at the site. According to the person in charge of the city water filtration plant, in the spring of each year, the upstream diversion systems do overflow creating discharge over the spillway crest.

Computed Discharges:

Ungated spillway	3057 cfs
Ungated spillway, design flood	2400 cfs (1/2 PMF)
Ungated diversion upper (max.)	94 cfs
Ungated diversion lower (max.)	608 cfs

c. Elevation (feet above MSL)

Top of dam	578
Maximum pool - design discharge	578 (1/2 PMF)
Emergency spillway	573
Stream bed at centerline of dam	540

d.

Length of top of dam pool	1400 feet
Length of maximum pool	1400 feet (1/2 PMF)
Length of normal pool (at spillway crest)	1370 feet

e. Storage

Top of dam	375 acre feet
Design surcharge	375 acre feet (1/2 PMF)
Spillway crest	306 acre feet

f. <u>Reservoir Surface</u>

Top of dam	14.10 acres
Maximum pool	14.00 acres (1/2 PMF)
Spillway crest	13.50 acres

g. <u>Dam</u>

Type - Earth embankment.
Length - 500 feet.
Height - 50 feet.
Freeboard normal reservoir and top of the dam - 5 feet.
Top width - 10 feet (estimated).
Side Slopes - 2 horizontal to 1 vertical.
Zoning - Not determinable.
Core - Core wall with concrete cap at elevation 358.6±.
Grout Curtain - Not determinable.

SECTION 2 - VISUAL INSPECTION

2.1 SUMMARY

a. General

The visual inspection of Brookside Reservoir in the City of Amsterdam took place on June 16, 1978. The dam has undergone modification and continued maintenance over the years. The last design work was performed in 1965 by Consulting Engineering firm of O'Brien & Gere. Plans for portions of this work are included in this report.

b. Dam

The dam and diversion works visually conform to the plans as provided in this report. Appurtenances related to ice harvesting have been removed from the site and a pump house is now located below the dam (see photographs in this report). The dam embankment is generally in good condition with no area of seepage or erosion noted. Two large animal holes were noted in the embankment, as was a small area which has exhibited a slight amount of sloughing. These items are also described in the inspection report. The vegetative growth is getting to be quite heavy on portions of the embankment making it difficult to inspect. A large dead tree is located near the top at the spillway (see photograph No. 11).

c. Appurtenant Structures

An old valve control and pump house on the west side below the toe of the dam has a leak. The City indicated it intends to repair the valve in the near future. This doesn't appear to affect the dam structure, however it is providing a small area of ponding and wetness below the dam. The drawdown pipe or mud blowout pipe valve is checked periodically. The spillway was reconstructed in 1965 and is in good condition. Two diversion tunnels around the reservoir are also in good condition.

d. Reservoir Area

The reservoir area is entirely riprapped and is in good condition.

e. Downstream Channel

The downstream channel in the immediate area is ledge rock with relatively steep side slopes. The channel was observed a short distance for a distance of several hundred feet below the dam and is in good condition, free of debris and erosion. Further downstream, a distance of approximately a mile, the stream discharges through the center portion of the City of Amsterdam.

SECTION 3 - HYDROLOGY AND HYDRAULICS

3.1 EVALUATION OF FEATURES

a. Design Data

No information was obtained relevant to design of the dam. For this investigation, the dam was evaluated for a Probable Maximum Flood (PMF) hydrograph using Probable Maximum Precipitation rainfall data obtained in Hydrometeorlogical Report No. 51. Both the PMF and 1/2 PMF were evaluated whereas the 1/2 PMF was assumed to be approximately the Standard Project Flood (SPF) in utilizing the U.S. Army Corps of Engineers Hydrologic Engineering Center's Computer Program UHCOMP. The program UHCOMP was used to develop a unit hydrograph computed by Clark Method parameters and a flood hydrograph. The U.S. Army Corps of Engineers Hydrologic Engineering Center's Program HEC-1 was used to route the flood through the dam emergency spillway using the Modified Puls Method. The drawdown pipe was assumed not to be in operation during the flood crest since it requires manual operation and is capable of only a negligible amount of discharge. The two diversion conduits were assumed to be operational with each having approximately 5 feet of head. No runoff enters the reservoir unless it surcharges over the diversion structure headwall weirs which are in located in series above the reservoir. The reservoir normally only contains water from the filtration plant which is above the reservoir. All low flow conditions are diverted. It was assumed that the spillway crest was on the threshold of spilling at the start of the flood routing and there was no flood storage available below the top of spillway elevation. Peak flow discharges were approximately 5900 cfs and 3000 cfs for the PMF and 1/2 PMF events routed through the spillway. The relatively small reservoir impoundment area above the dam face had little effect in reducing the PMF and 1/2 PMF discharges. The stage - discharge relationship on page C-18 indicates the dam would approach being overtopped if the diversion conduits became clogged with trees and debris.

b. Experience Data

No information was obtained from knowledgeable people at the site relevent to performance of the spillway during extreme rainfall events. Only that in the spring of each year the dam is spilling, but routinely that it is not significant.

SECTION 4 - STRUCTURAL STABILITY

4.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

An earthen embankment presently forms the visible upstream and downstream sides of the dam. The downstream face, at approximately a 2 horizontal to 1 vertical slope, is benched at approximately midheight, and is covered with grasses and some low tree growth. Some animal holes were detected on this face. Except for the uppermost section, the upstream slope is provided with riprap in good condition. No indication of misalignment, significant sloughing, crack development or other structural deformation was noted. However, a small section of upstream embankment near the spillway has experienced slight sloughing.

New and old pumphouses are small structures located at the downstream toe of the dam. A small excavation has recently been made at the rear of the old pumphouse, slightly above the toe of the embankment slope, in order to perform repairs on buried pipe. Limited sloughing of soil has occurred, probably from leaking water ponding in the excavation. No evidences of seepage through the dam embankment or below the downstream toe were observed.

The concrete spillway structure located in the vicinity of the dams easterly abutment is generally in good condition with no indication of structural distress. The gatehouse, situated within the reservoir close to the dams westerly abutment, is similarly in serviceable condition with no indication of structural distress. A Bunn Creek bypass culvert extending along the reservoirs easterly shoreline is also in serviceable condition.

b. Geology and Seismic Stability

The reservoir is surrounded by a loam clay to clay of lacustrine origin. Middle Ordovician limestone is exposed at the northern end of the reservoir along Bunn Creek as well as along the valley floor south of the emergency spillway and beneath the end of the spillway. Erosion by Bunn Creek has removed the clays exposing the limestone, a condition most likely beneath the reservoir where it covers the original creek bed.

At the foot of the spillway, in the valley floor, the limestone is very gently folded. Bedding is horizontal in the center of the valley beneath the spillway. Inclination of the beds increases toward the west wall of the valley, striking N70W and dipping as much as 10 degrees to the north. Several joint sets are present in the limestone. No significant solution widening of joints was seen. No flow of significance was noted from along the bedding planes between the layers.

Faults are not known to be present within the city limits of Amsterdam, nor have any recorded earthquakes occurred within those limits. In 1882 a low intensity earthquake (Intensity II-Modified Mercalli) occurred about 4 miles west of Amsterdam, probably along the Tribes Hill fault, and had its effects felt in the city. An earthquake of greater intensity (M.M. Intensity IV to V) occurred in 1916 about 7 miles east of the city. However, no significant earthquake activity is anticipated in the area of the reservoir.

c. <u>Data Review and Stability Evaluation</u>

Limited design data applicable to the reservoirs early development provides information on some of the original construction but as-built information relating to the presently existing enlarged earth dam embankment, is not available. The old drawings indicate the presence of a masonry and concrete core wall founded on a rock foundation. Spillway area rock exposure and outcroppings indicate the surface or near-surface existance of rock in the general area of the embankment. The present good structural condition of the dam with no sign of settlement or other structural movement, would indicate the embankment structure is supported on firm or solid earth materials. The observed downstream slope of 2 horizontal to 1 vertical (estimated), and an apparent somewhat flatter upstream slope has provided an embankment which has performed satisfactory to date with no indication of distress. Continued stability is anticipated for loading conditions comparable to those which have occurred to date.

SECTION 5 - ASSESSMENT/REMEDIAL MEASURES

5.1 DAM ASSESSMENT

On the basis of the Phase I visual examination, the Brookside Dam appears to be adequate for normal reservoir operation. However, if the diversion channels were plugged during a 1/2 Probable Maximum Flood, the spillway capacity of the existing structure is questionable. Heavy brush and tree growth on the downstream face of the dam made visual inspection and observation of the condition of the downstream face difficult. A large dead tree was found on top of the embankment near the spillway. The presence of animal holes in the downstream face of the dam indicate possible sources of problems. A wet spot in the bottom toe of the embankment, reputedly caused by malfunctioning operation of the valve in a valve house, may also be a source of problems.

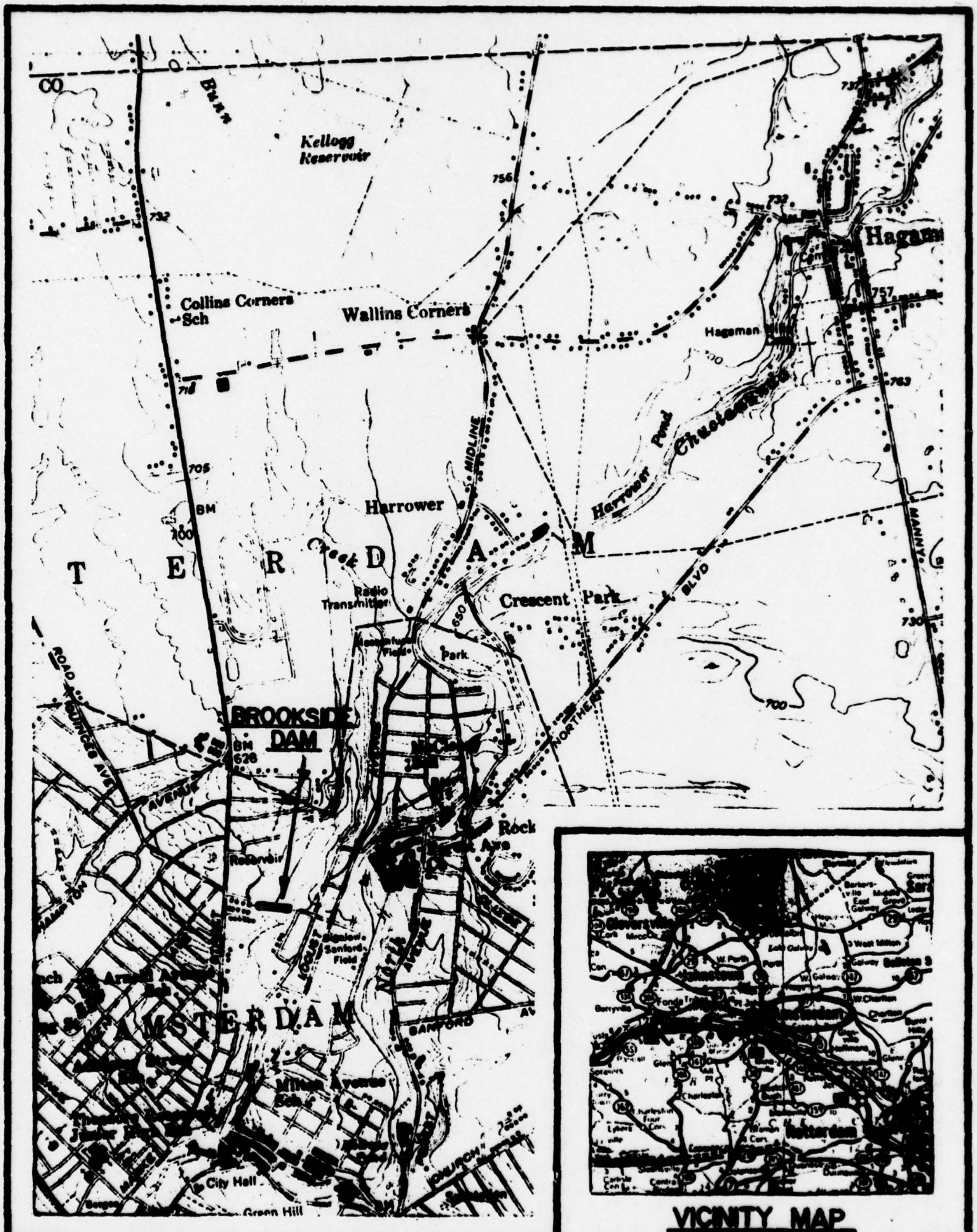
5.2 REMEDIAL MEASURES

a. Alternatives

Care should be taken to assure that the entrance to the diversion channels are maintained at all times. Failure to keep the diversion channels open would cause the emergency spillway to flow at its ultimate capacity with no freeboard during a storm equal to 1/2 Probable Maximum Flood. The downstream face of the dam should be cleared of brush and trees should be removed from the embankment. Animal holes should be properly filled. The malfunctioning valve in the valve house at the toe of the dam is a minor problem which should be repaired and the condition of the wet spot should be monitored to be sure that no seepage is developing at this point.

b. Operation and Maintenance

Normal operating procedure includes routinely checking blowoff or drain down valve in the gate house, maintenance of slopes and riprap. Excess flows normally discharge through the discussed conduits. The reservoir site is also the location of the city filtration plant which has a full time staff. The dam embankment should be cut, cleared and routinely maintained. At the time of inspection the city indicated this was a low priority item.



LOCATION PLAN

FIGURE 1

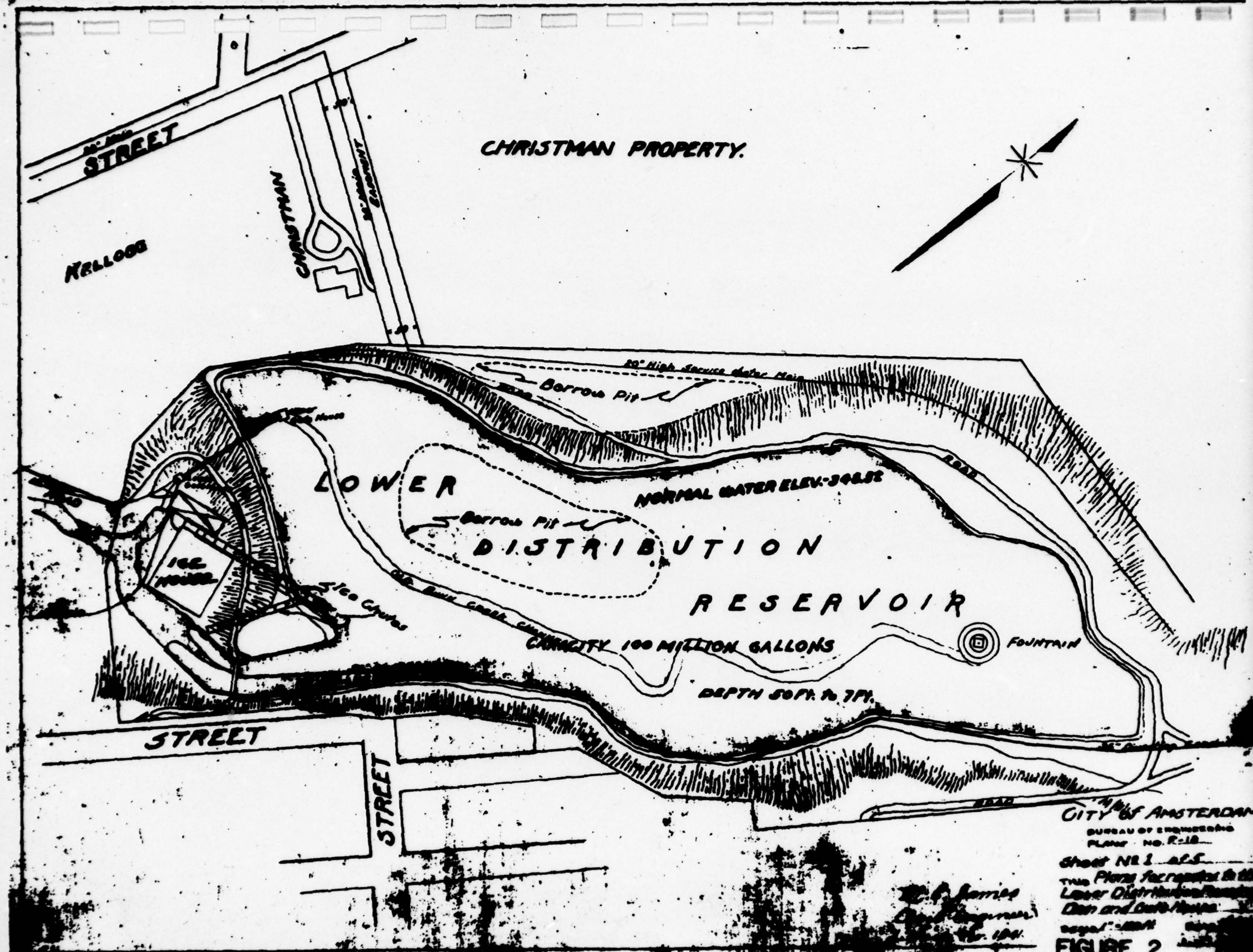

CHRISTMAN PROPERTY.
STREET
CHRISTMAN
KELLOGG
Borrow Pit
LOWER
DISTRIBUTION
RESERVOIR
Borrow Pit
NORMAL WATER ELEV.-348.82
ICE HOUSE
CAPACITY 100 MILLION GALLONS
DEPTH 50 Ft. to 7 Ft.
FOUNTAIN
ROAD
STREET
STREET
CITY of AMSTERDAM
BUREAU OF ENGINEERING
PLANS NO. F-10
Sheet No 1 of 5

FIGURE 2

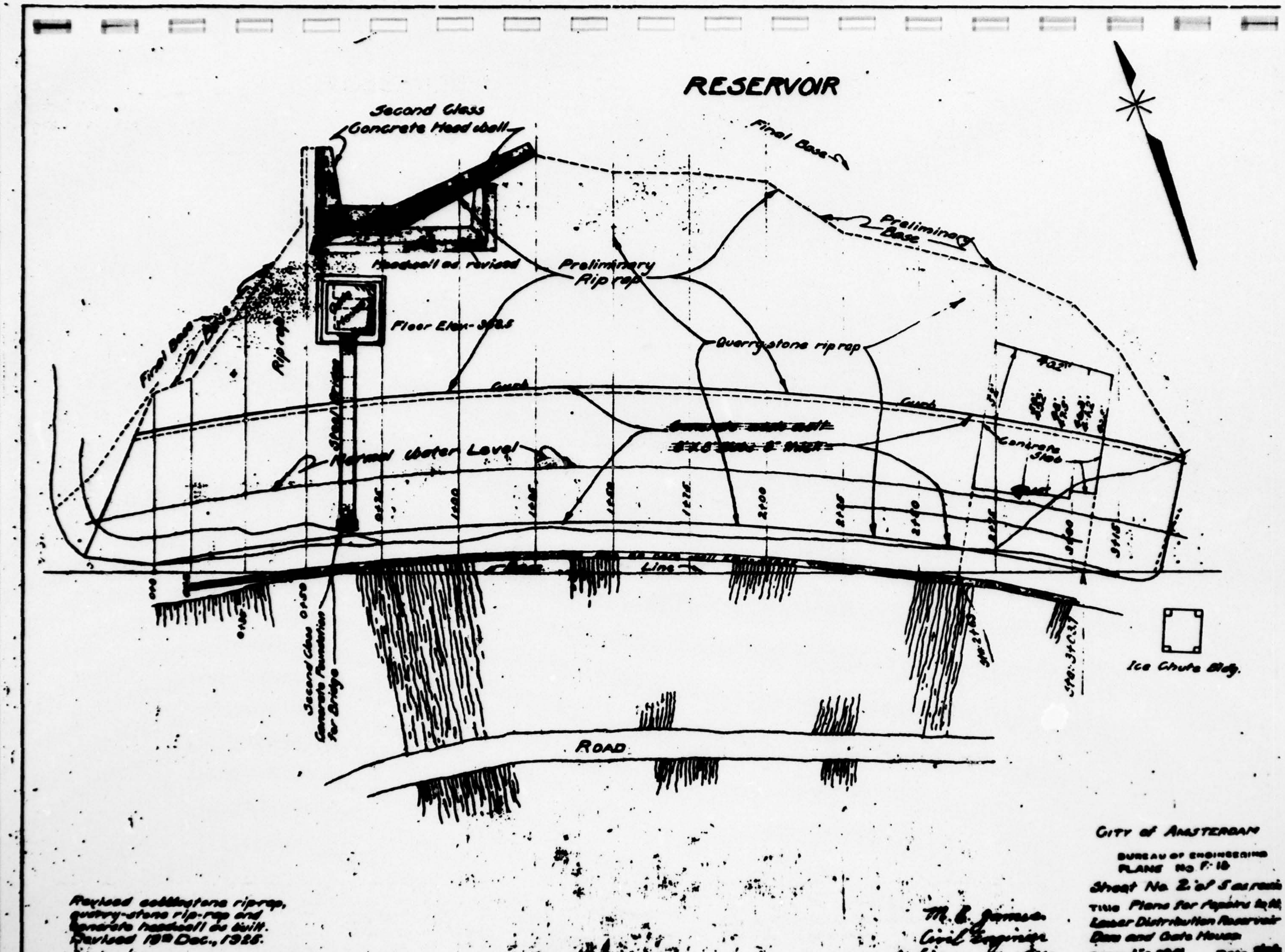
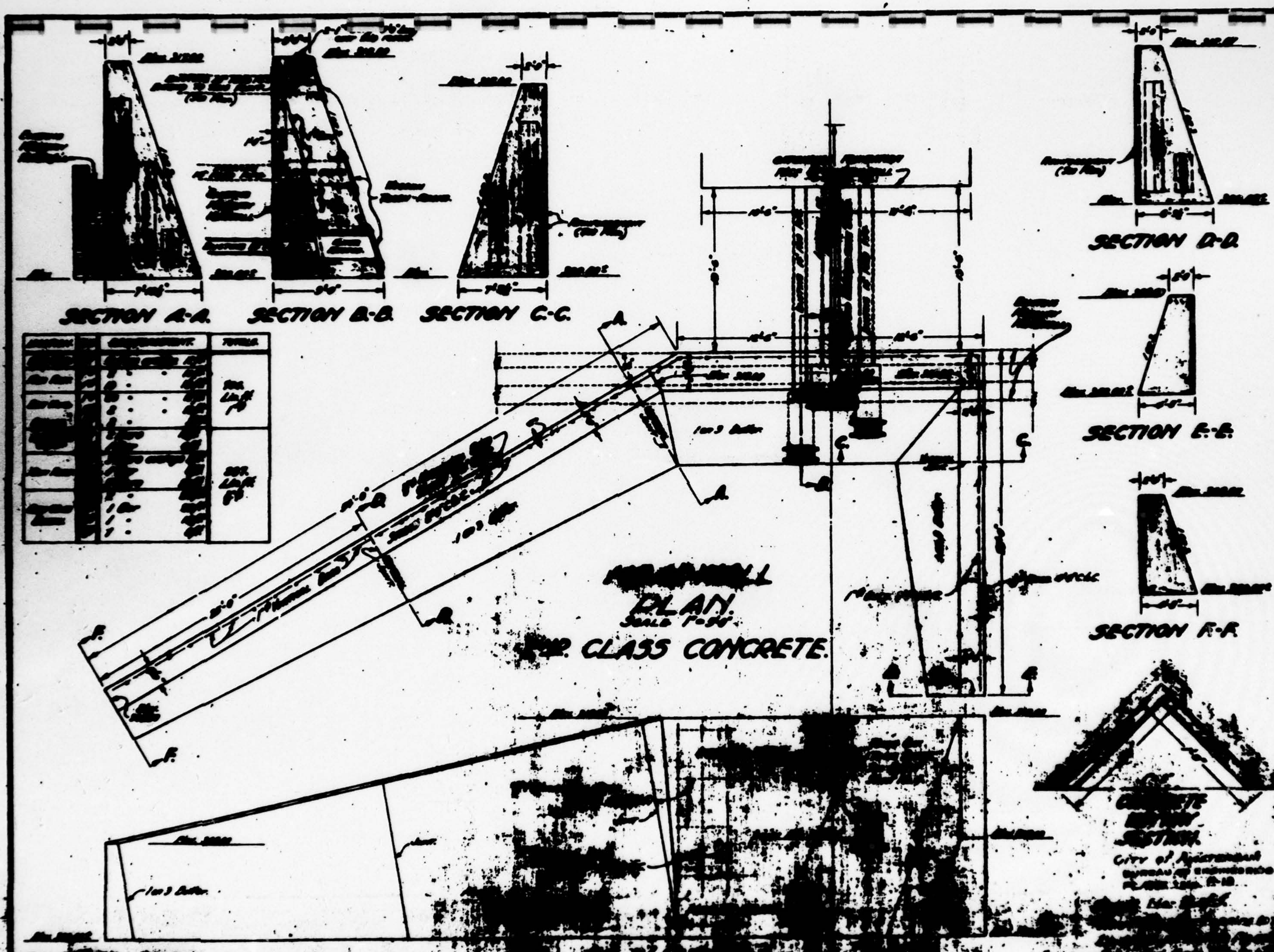
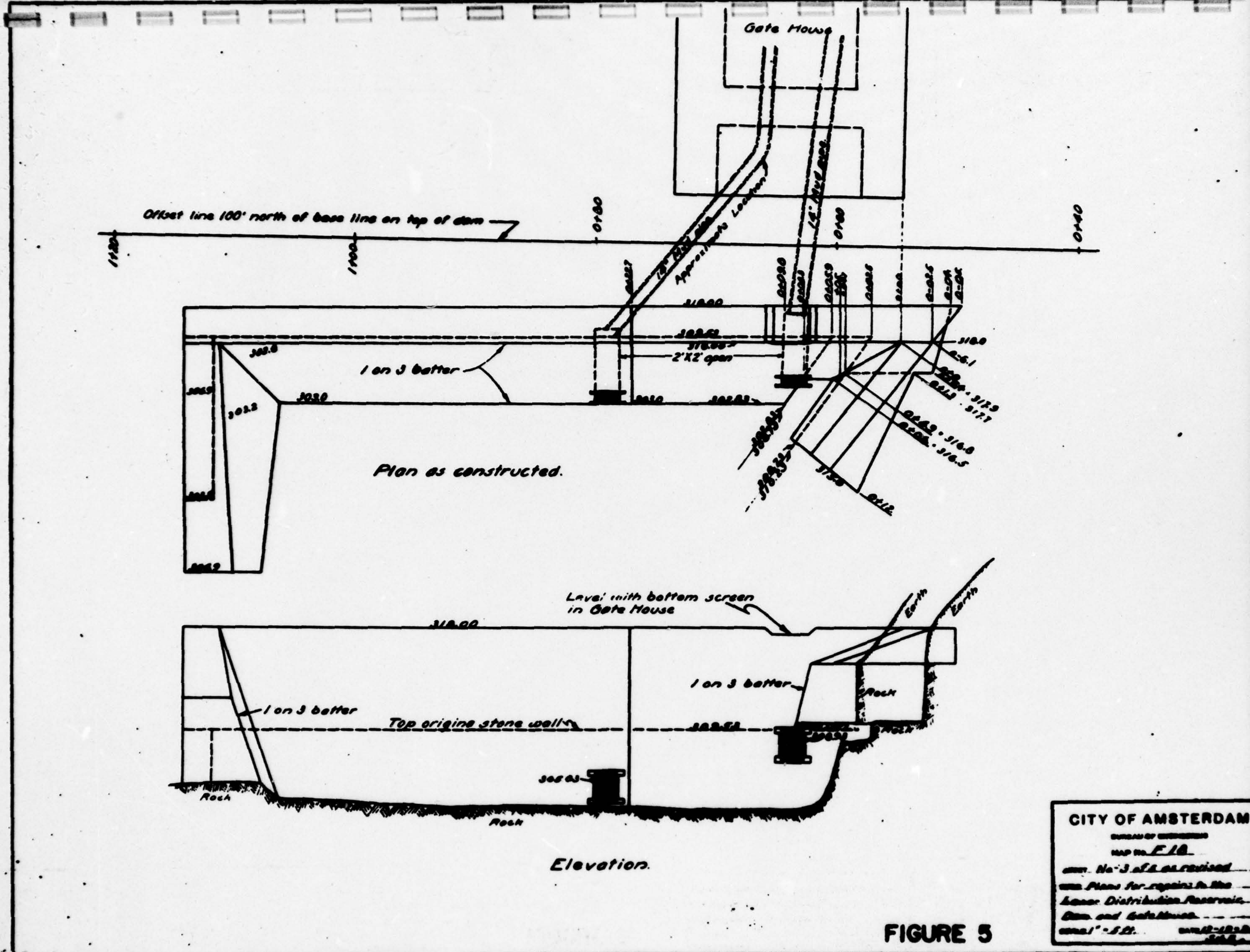

RESERVOIR
Second Class Concrete Head Wall
Final Base
Preliminary Base
Headwall as revised
Preliminary Rip rap
Floor Elev.
Quarry stone rip rap
Rip rap
Curb
Normal Water Level
Concrete Slab
Line
Second Class Concrete Foundation for Bridge
Ice Chute Bldg.
ROAD
City of Amsterdam
Bureau of Engineering
Sheet No. 2 of 5
Revised cobblestone rip-rap, quarry-stone rip-rap and concrete headwall as built. Revised 19th Dec., 1925.
Civil Engineer

FIGURE 3



SECTION A-A.
SECTION B-B.
SECTION C-C.
SECTION D-D.
SECTION E-E.
SECTION F-F.
PLAN
CLASS CONCRETE
CONCRETE
SECTION
City of

FIGURE 4



Gate House
Offset line 100' north of base line on top of dam
Approximate Location
Plan as constructed.
1 on 3 batter
2'X2' open
Level with bottom screen
in Gate House
Earth
Rock
Top original stone wall
Elevation.
CITY OF AMSTERDAM

FIGURE 5

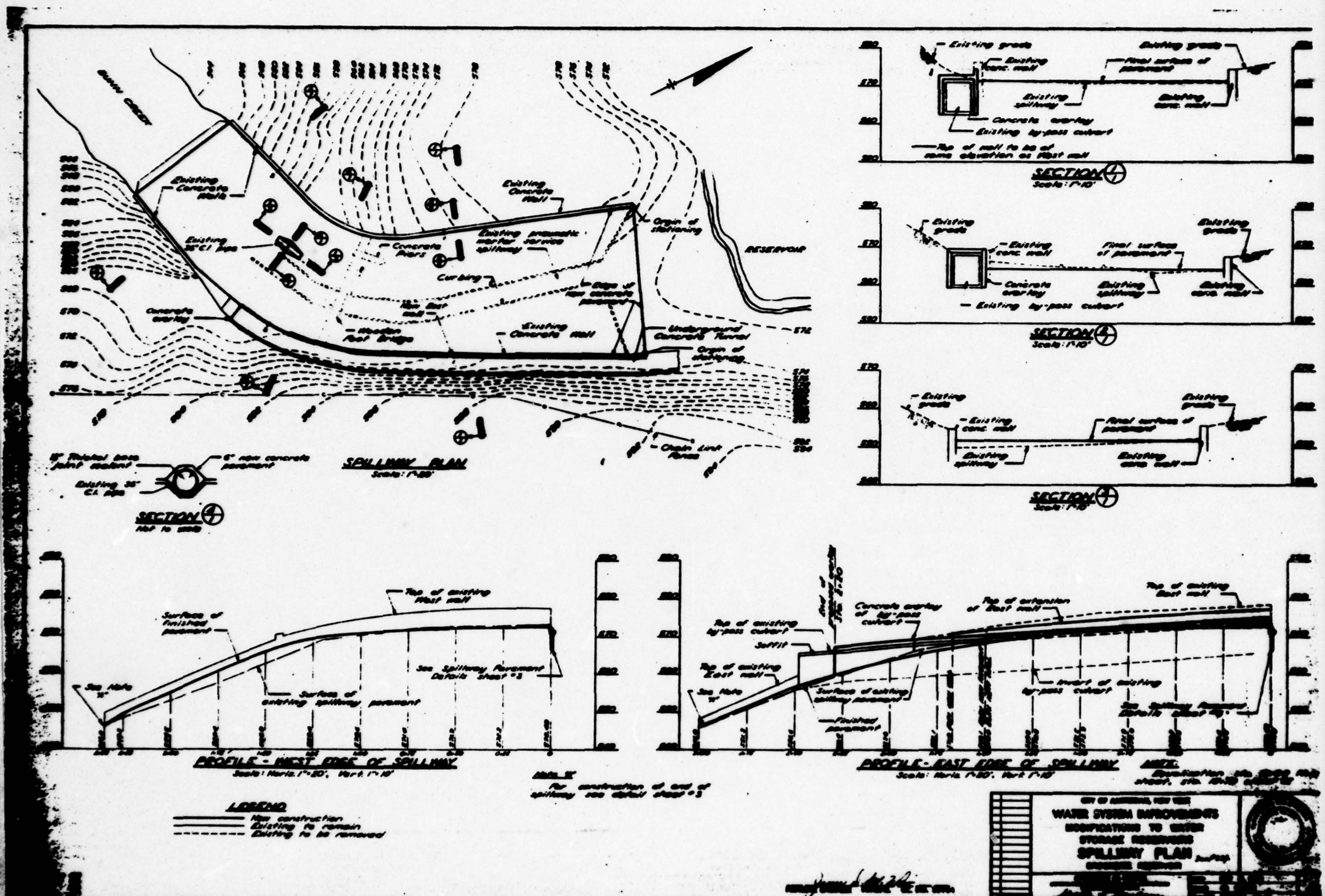

SPILLWAY PLAN
Scale: 1"=20'
Existing Concrete Walls
Existing Concrete Wall
Existing 36" C.I. Pipe
Concrete Piers
Existing pneumatic mortar service spillway
Curbing
Edge of new concrete pavement
Origin of stationing
RESERVOIR
New East wall
Wooden Foot Bridge
Existing Concrete Wall
Underground Concrete Tunnel
Concrete overlay
Chain Link Fence
15" Thiokol base joint sealant
6" new concrete pavement
Existing 36" C.I. pipe
SECTION
Not to scale
SECTION
Scale: 1"=10'
Existing grade
Existing conc. wall
Final surface of pavement
Existing spillway
Concrete overlay
Existing by-pass culvert
Top of wall to be of same elevation as West wall
Existing conc. wall
PROFILE - WEST EDGE OF SPILLWAY
Scale: Horiz. 1"=20', Vert. 1"=10'
Top of existing West wall
Surface of finished pavement
Surface of existing spillway pavement
See Spillway Pavement Details sheet #3
PROFILE - EAST EDGE OF SPILLWAY
Scale: Horiz. 1"=20', Vert. 1"=10'
Top of existing East wall
Top of extension of East wall
Concrete overlay of by-pass culvert
Top of existing by-pass culvert
Soffit
Surface of existing spillway pavement
Finished pavement
Invert of existing by-pass culvert
LEGEND
New construction
Existing to remain
Existing to be removed
WATER SYSTEM IMPROVEMENTS
MODIFICATIONS TO WATER STORAGE RESERVOIRS
SPILLWAY PLAN

FIGURE 6

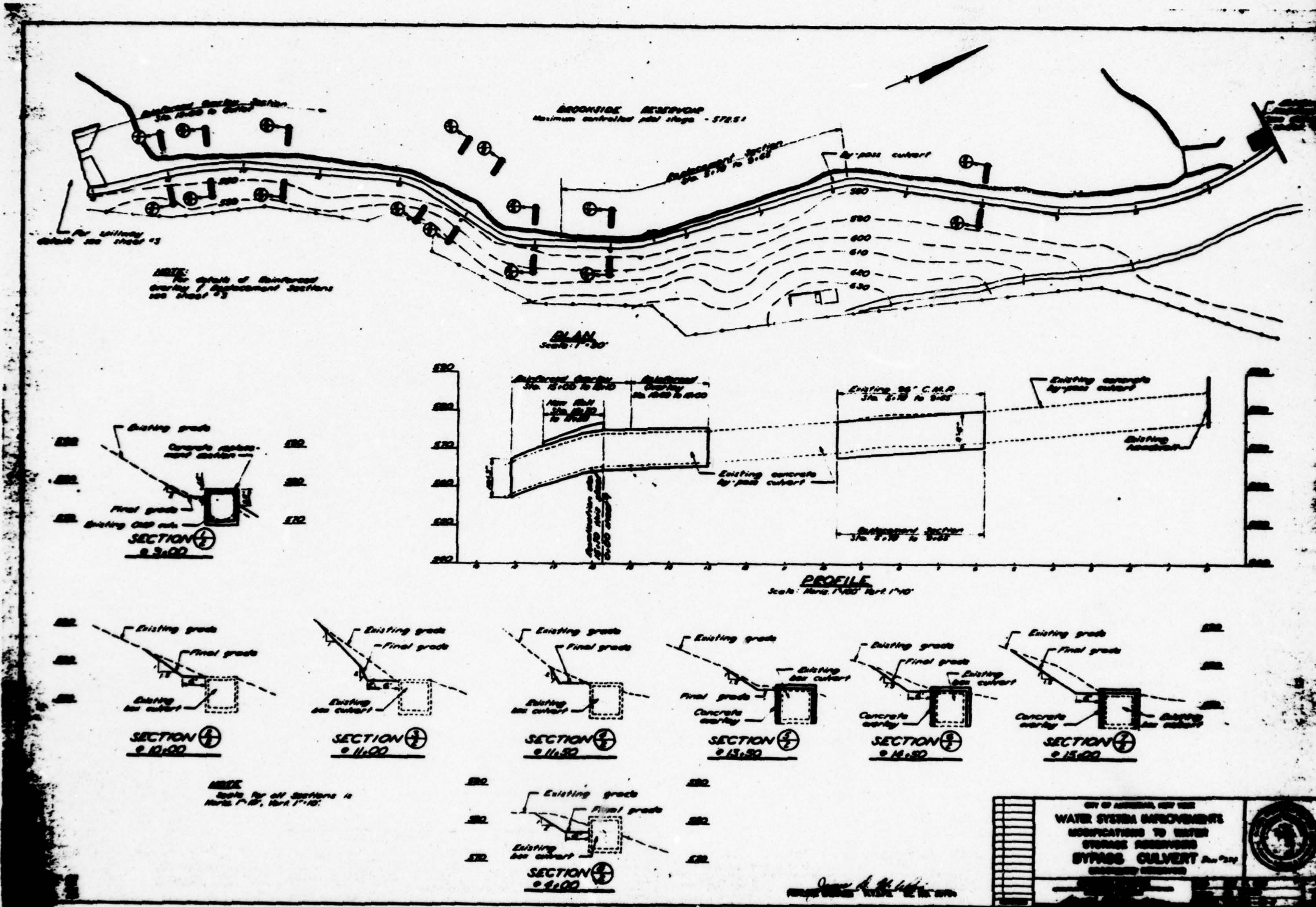

BROOKSIDE RESERVOIR
Maximum controlled pool stage - 572.5'
Reinforced Overlay Section
By-pass culvert
For spillway details see sheet #3
NOTE: For details of Reinforced Overlay & Replacement Sections see sheet #3
PLAN
PROFILE
Existing concrete by-pass culvert
Existing headwall
Existing grade
Final grade
Existing box culvert
Concrete overlay
SECTION
NOTE: Scale for all Sections is Horiz. 1"=10', Vert. 1"=10'.
WATER SYSTEM IMPROVEMENTS
MODIFICATIONS TO WATER STORAGE RESERVOIRS
BYPASS CULVERT

FIGURE 7

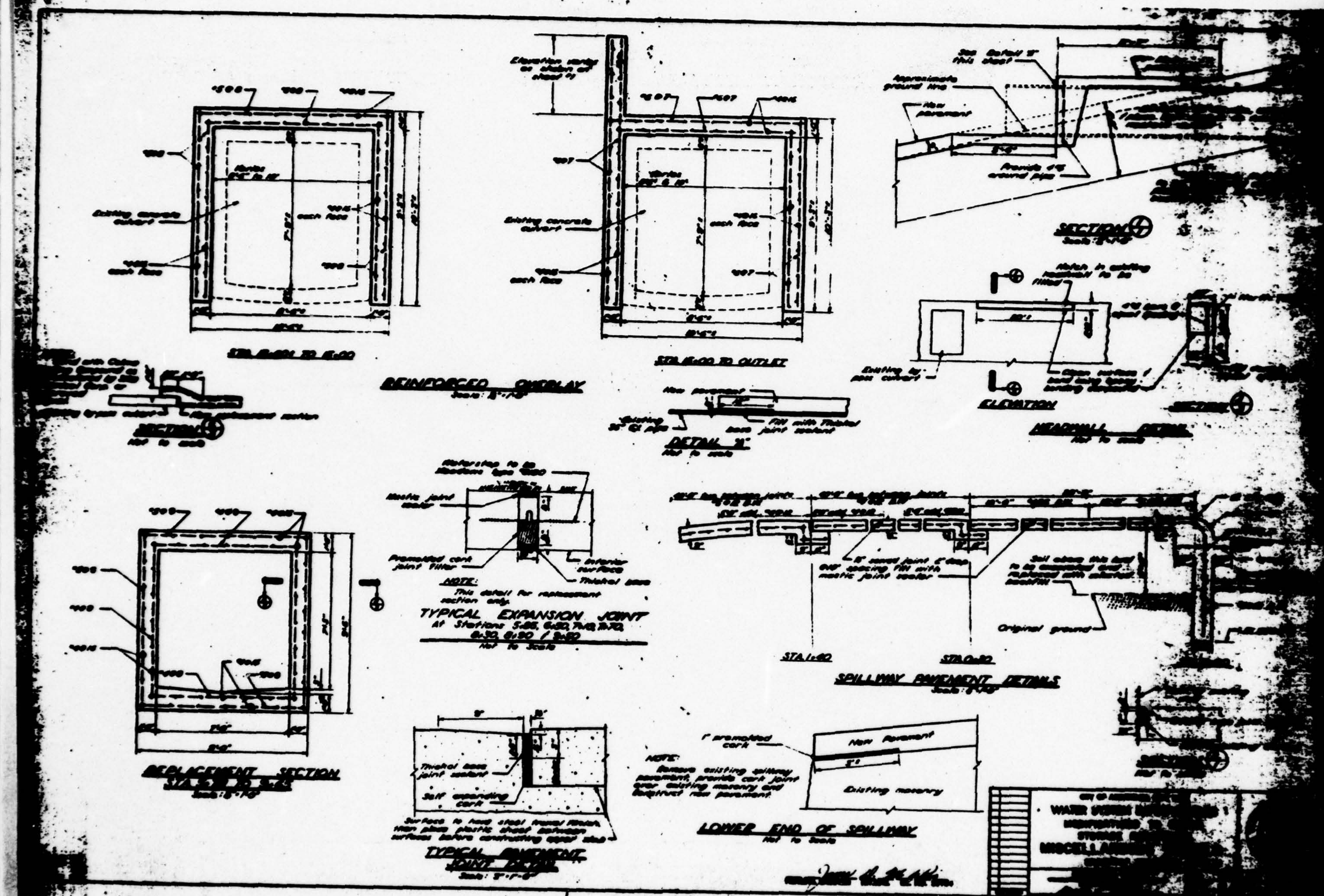

REINFORCED OVERLAY
STA 15+00 TO OUTLET
Existing concrete culvert
DETAIL
ELEVATION
HEADWALL DETAIL
Not to scale
TYPICAL EXPANSION JOINT
At Stations 5+85, 6+50, 7+10, 7+70, 8+30, 8+90 & 9+50
Not to Scale
NOTE: This detail for replacement section only.
Premolded cork joint filler
Mastic joint sealer
Interior surface
Thiokol base
SPILLWAY PAVEMENT DETAILS
STA 1+40
STA 0+30
Original ground
REPLACEMENT SECTION
TYPICAL PAVEMENT JOINT DETAIL
Thiokol base joint sealant
Self expanding cork
LOWER END OF SPILLWAY
Not to Scale
1" premolded cork
New Pavement
Existing masonry
NOTE: Remove existing spillway pavement, provide cork joint over existing masonry and construct new pavement.
MISCELLANEOUS

FIGURE 6

APPENDIX A

FIELD INSPECTION REPORT

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam Amsterdam, Brookside   County Montgomery   State New York   ID # 168

Type of Dam Earthen   Hazard Category 1

Date(s) Inspection June 16, 1978   Weather Sunny   Temperature 75°

Pool Elevation at Time of Inspection 4 feet below spillway M.S.L.   Tailwater at Time of Inspection Below outlet spillway pipe.

Inspection Personnel:

N. F. Dunlevy - Dale Engineering Company   E. Hardie, Director of Public Works, City of Amsterdam

D. McCarthy - Dale Engineering Company   F. Kowlowski, Chief Plant Operator, City of Amsterdam

H. Muskatt - Dale Engineering Company   J. Ochal, City Engineer, City of Amsterdam

F.W. Byszewski - Dale Engineering Company

Neal F. Dunlevy Recorder

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N/A	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL & HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	
STAFF GAGE OF RECORDER	N/A	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed. Evaluation difficult due to heavy vegetation.	Mow embankment for future inspection activity.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Two animal holes observed in embankment. One 12-inch, halfway middle section, one 8-inch, near top, right side. Sloughing believed to occur behind location of old pump house.	Excavate & backfill animal holes with appropriately prepared and compacted material. Inspect for additional animal holes after mowing embankment. Verify sloughing if evident; provide remedial actions.
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Difficult to evaluate due to heavy vegetation.	
RIPRAP FAILURES	Old riprap disarranged.	Perform selected riprap placements.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
EMBANKMENT CROP COVER	Heavy grasses, weeds and small tree growth on embankment. One large 12-trunk tree cluster on top of embankment near spillway. Tree appears dead.	Remove large tree & excavate to remove root system. Backfill appropriately. Clear and mow embankment more frequently. Last time was two years ago.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	With the exception of tree noted above and condition of heavy vegetation, there are no noticeable problems.	
ANY NOTICEABLE SEEPAGE	Embankment traversed with no notice of seepage.	
STAFF GAGE AND RECORDER	Water treatment plant flow gaged above and below reservoir. Stream flow diverted around reservoir.	
DRAINS	None observed.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Good condition.	
APPROACH CHANNEL	Good condition.	
DISCHARGE CHANNEL	Good condition, Bedrock.	
BRIDGE AND PIERS	None observed.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL		
APPROACH CHANNEL		
DISCHARGE CHANNEL		
BRIDGE AND PIERS		
GATES AND OPERATION EQUIPMENT		

OUTLET WORKS
AND DIVERSION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed in diversion and draw-down pipe.	Reservoir functions as a closed consumption system.
INTAKE STRUCTURE	Water into reservoir from 8 MGD water filtration plant. Dam intake structure draws down @ 15, 25, 48 ft. from surface. Lower level used currently.	Intake works using 3 plug caps only lower open. Discharges into 2 pumps in distribution system.
OUTLET STRUCTURE	Pump house capacity of 12 MGD with 3 electric pumps, 200 HP each, pumping from 24-inch pipe through dam. Draw-down pipe, 12 inches.	Draw-down pipe running 1/2 inch of water. Apparent valve chamber is not setting.
OUTLET CHANNEL	Good condition.	
EMERGENCY GATE	None.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	No obstruction, debris.	
SLOPES	Thalweg greater than 5% slope below spillway.	
APPROXIMATE NO. OF HOMES AND POPULATION	Downtown Amsterdam is below dam.	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Reservoir pool is riprapped. General condition is good.	
SEDIMENTATION	None observed. Closed system through filtration plant. Only sedimentation source through diversion overflow	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

NAME OF DAM Amsterdam, Brookside
ID # 168

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	See maps.
CONSTRUCTION HISTORY	None. Only dates on plans.
TYPICAL SECTIONS OF DAM	See maps.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See maps. Will compute.
RAINFALL/RESERVOIR RECORDS	At filtration plant.

ITEM	REMARKS
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available.
POST-CONSTRUCTION SURVEYS OF DAM	None available.
BORROW SOURCES	None available.

ITEM	REMARKS
MONITORING SYSTEMS	Flow gaging above and below dam.
MODIFICATIONS	From dated plans. Modifications to spillway and diversion system.
HIGH POOL RECORDS	Routing reservoir kept full and slightly spills. Reservoir pool down 4 feet on date of inspection due to filtration plant equipment problems.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None disclosed.
MAINTENANCE OPERATION: RECORDS	At filtration plant.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	See plans.
OPERATING EQUIPMENT PLANS & DETAILS	Closed reservoir system for water supply. Stream flow diverted to bypass reservoir.

BROOKSIDE RESERVOIR

CHECK LIST
HYDROLOGIC & HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 4.08 square miles

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 572.50

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 572.50

ELEVATION MAXIMUM DESIGN POOL: 578

ELEVATION TOP DAM: 578

CREST:

a. Elevation 572.50
b. Type Concrete
c. Width 150 feet
d. Length Max. 300 feet
e. Location Spillover Right side of embankment
f. Number and Type of Gates None

OUTLET WORKS: (Drawdown)

a. Type 14-inch pipe
b. Location Center of dam
c. Entrance Inverts ---
d. Exit Inverts 305.03
e. Emergency Draindown Facilities Yes, manually operated.

HYDROMETEOROLOGICAL GATES:

a. Type None
b. Location None
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: Not computed. City of Amsterdam below dam.

APPENDIX B

PREVIOUS INSPECTION REPORTS

ALBANY, N.Y.
BENSEN BLDG., 55 STATE ST.
Albany Knickerbocker Press

JUN 18 1917

AMSTERDAM RESERVOIR WILL BE STRENGTHENED

City Engineer Completes Plans to Eliminate Possibility of Another Break in Dam When Water Rises.

Special to The Knickerbocker Press.

AMSTERDAM, June 17.—Plans to prevent a recurrence of conditions at the Amsterdam distributing reservoir which resulted in a loss of over $100,000 Monday night when a large section of the city below the reservoir was flooded have been prepared by City Engineer Prentice and will be submitted to the common council Tuesday night. The plans call for the strengthening and repairing of the southern end of the reservoir and the enlargement of the spillway to four times its present capacity. This, it is believed, will be sufficient to carry off all surplus water.

The cause of the trouble Monday, according to city officials, was the inability of the spillway to carry off the unusually large volume of water that poured into the reservoir from the watershed. The spillway is eight or ten inches above the top of the concrete core of the retaining wall, and as a result the earth capping of the core, four or five feet thick, was washed away.

In two places large sections of the earthen wall was washed away, the flood water washing out deep holes outside of the wall. At both these places a concrete buttess will be built, and the earth top replaced by concrete.

"We intend to enlarge the spillway as a safeguard," said Mayor Cline. "This will merely give greater security against the dam givin way—a danger which never existed. The dam consists of a core wall of masonry, covered front and rear with earth embankments. The flood of Monday was of so much greater volume than any heretofore that the spillway did not carry the water away fast enough, with the result that the dam overflowed, washing away the earth covering in two places."

[illegible] Amsterdam, N. Y.
Serial No. 274

The papers relating to this dam (City of Amsterdam, Applicant) which were received by the writer on Friday June 29, 1917, were as follows:

> Application form W91, dated June 29, 1917, and signed by E. H. Prentice as City Engineer for city of Amsterdam.
>
> Map H25 (Acc. 8051) on tracing cloth, dated June 13, 1937, showing plan of proposed enlargement of spillway at distributing reservoir and also profile and sections of the spillway channel. Scale 1"=20'
>
> Map H26 (Acc. 8052) on tracing cloth, dated June 26, 1917, showing plan of the two adjacent reservoirs, and sections through the earth embankment and core wall, on center line of the head gate tower and connecting culvert.

The following described data is lacking, although expressly required by the printed instructions to applicants:

> U. S. G. S. Sheet or other form of general location map.
>
> Engineer's report as to adequacy of proposed spillway, etc.

Plans are lacking in clearness, or are in error in the following particulars:

> On map H-25, the profile elevation of station 0-20 (crest) is indicated as being 349.50 with a down stream slope toward station 0+00, while the cross section through section A-A at station 0+00 shows the same elevation of 349.50 for the channel bottom.
>
> On map H-25 the elevation of top of core wall is indicated on the plan of the dam as being 349.62, or only 12/100 of a foot above the crest of the spillway channel, while on map H-26 the top of the earth embankment is indicated as being level with the top of such wall.
>
> The core wall is not indicated as being well bonded with the bottom and sides of the spillway channel and extending the full length of the earth embankment and a proper distance into the natural surface at each end.

The site of the dam seems to be the one appearing immediately north of the city of Amsterdam on the United States Geological Survey quadrangle (No.189) which is designated by the same name. The impounded reservoir is distinguished by its elevation, there indicated as 570 feet above sea level. The elevations in the city below are indicated as being from 75 to 300 feet lower.

The drainage area on Bunn Creek above such dam site seems to be between 4-1/2 and 5 square miles, as outlined and planimetered on the attached map. The slopes are generally rolling or fairly steep. The tributary stream beds are indicated as short and fairly straight, and seemingly capable of delivering run-off to their full capacities in a very short period of time. A small portion of the discharge from Hans Creek watershed (area about 25 square miles) and from the watersheds of Rodger's and McQueen's Creeks (combined area 3.5 square miles) is diverted from considerably higher elevations into the watershed of Bunn Creek. There appear to be two other small reservoirs on Bunn Creek above the one under consideration, but as all three are small and maintained for other purposes in connection with the water supply system of the city of Amsterdam, their combined effect in reducing the flood discharge of the stream seems almost negligible.

The maximum probable flood on the watershed of Bunn Creek only, as indicated by the enveloping curve (Acc. C-1618) ordinarily used in this office, would be about 260 cubic feet per second per square mile of catchment, which is equivalent to a total discharge of about 1300 cubic feet per second at the site under consideration. This flow was actually recorded in August, 1905, from the five miles

[illegible] area tributary to Mad Brook above Sherburne, N. Y. [illegible] watershed of the last named stream is somewhat more [illegible]pitous than that of Bonn Creek, the reservoir under consideration stands adjacent to and high above a city with over 34,000 inhabitants and, in this connection, it may be interesting to note that a watershed of 10 square miles, above the city of Erie, Pa., discharged about 800 second feet per square mile during a severe storm in August, 1915.

The capacity of the spillway channel has been estimated in accordance with the following assumptions:

1. That the elevation indicated for top of core wall is correct for the existing wall only, and that the top of the proposed 4 ft. addition to such wall will rest approximately at elevation 353.62.

2. That the correct elevation for crest of spillway is 349.50 feet above datum.

3. That maximum probable flood may occur when reservoir is filled to the crest of the spillway channel.

4. That the diversion from other watersheds (estimated in 1909 by Chief Engineer of N.Y. State Health Dept. as but 22,500,000 gallons per day) may properly be neglected.

5. That the effect of storage above the elevation of the crest of the spillway in the reservoir under consideration (about 2,400,000 cubic feet or [illegible] inches on the watershed) may be properly neglected, as well as the discharging capacity of the 36" [illegible] pipe from the diverting dam above.

6. That the effect of velocity of approach in the spillway channel may be neglected.

7. That the measuring weir or other obstruction [illegible] near left end of map H-25) will not appreciably [illegible] the flow in the spillway channel at the point [illegible] on the profile as station 0+50.

8. That the bottom of the spillway channel [illegible] indicated on the profile (map H25) as [illegible] properly protected, or that other conditions [illegible] that undue erosion will not be caused by [illegible] velocities.

...ances of the proposed slopes, the channel dimensions, ... conditions surrounding this study, are such that it is ...t to prophesy the resulting capacity of the spillway channel ...er than a rough approximation. In United States Geological Survey Water Supply Paper #200 are recorded the results of gaging the discharge over at least five broad crested weirs (which varied in breadth from 5.875 feet to 16.302 feet) under heads of about four feet, as in the present case. The coefficient values, for use with the Francis weir formula, as derived from such gagings, only varied from 2.46 up to 2.64, and seem to indicate that the increase in breadth did not materially affect the resulting discharge with such head of 4 ft. It has, therefore, been assumed that the low horizontal slopes of this spillway channel approach the conditions of a weir of indefinite crest breadth. Such coefficient of 2.46 has therefore been used and indicates a probable maximum discharging capacity for a channel 68 feet wide of 1340 cubic feet per second. This would seem to indicate that a channel width-at the crest-of approximately 100 feet would be required to discharge 400 cubic feet per second per square mile of watershed, which is one-half the maximum rate of flood discharge previously mentioned.

It may also be of interest to note that a curve derived by Mr. Robert E. Horton (by a separate set of gagings from those already referred to) for application in computing the discharge over weirs with varying apron slopes, gives a coefficient for use with the Francis formula of 2.44 when the value for the down stream slope of the channel under consideration is used. This would, to some extent, seem to confirm the use of the value of 2.46 for such coeff...

...puting the probable spillway channel capacities which ...ted above.

Respectfully submitted,

John W. Henry

JUNIOR ENGINEER.

To Mr. A. H. Perkins,

Division Engineer.

July 2, 1917.

MEMORANDUM REGARDING RECONSTRUCTION OF DAM #274 MOHAWK
ON BURN CREEK ABOVE AMSTERDAM, N. Y.
(Supplementing Memorandum Dated July 2,1917)
City of Amsterdam, Applicant

Serial No. 279

- -

The Papers as submitted in accordance with the revisions required by this Commission's letter of July 10, 1917, were as follows:

1. Revised Application, form W91, dated July 24, 1917, completed in triplicate, and executed by Edward H. Prentice as City Engineer for the City of Amsterdam.

2. Engineer's Report (3 sheets), dated July 24, 1917, presumably by Edward H. Prentice, City Engineer, but unsigned.

3. General location and watershed map (Acc. 8137, 8138), delineated on U. S. G. S. Broadalbin and Amsterdam quadrangles.

4. Blue print of Revised Map H-26 (Acc. 8139) dated June 26, 1917, submitted in duplicate, showing plan of the two adjacent reservoirs and sections through the earth embankment and core-wall, on center line of the head gate tower and connecting culvert.

5. Blue print of revised map H-27 (Acc. 8140) dated July 17, 1917, submitted in duplicate, showing revision of plan proposed for enlargement of spillway at distributing reservoir, together with revised profile and sections of the spillway channel and walls - Scale 1" = 20'.

The revised plans are lacking in clearness in regard to the removal of the Hygeia Ice Company's building and ice chute, which was properly indicated on map H-25 (Acc. 8051) as first submitted.

The spillway channel capacity, as computed from the data indicated on the revised plans and information furnished in the engineer's report, appears to be ample to care for a flood discharge of 2000 cubic feet per second, or the equivalent of about 400 cubic feet per second per square mile.

C O N C L U S I O N S

The revised plans and engineer's report seem to indicate that the reconstruction of the dam and spillway channel as now proposed would be properly effective and reasonably safe, providing that the following conditions are complied with.

1. That the Hygeia Ice Company's ice chute and building will be removed a reasonable distance from the spillway channel.

2. That the proposed masonry cut-off wall will be well bonded with the bottom and sides of the spillway channel, and will extend well into the natural surface at both sides.

Respectfully submitted,

John W. Henry

JUNIOR ENGINEER.

To Mr. A. H. Perkins,

Division Engineer.

July 28, 1917.

(4 copies made)

CITY OF AMSTERDAM
DEPARTMENT OF PUBLIC WORKS
C. S. MESSINGER, COMMISSIONER
EDWARD H. PRENTICE, CITY ENGINEER

July 24,1917.

Mr. A.H.Perkins, Division Engineer,
State Conservation Commission,
Albany, N.Y.

Dear Sir:-

I am returning under separate cover plans for repairs and improvements to the distributing reservoir dam at Amsterdam and enclose herewith application for approval of the same. The changes are necessary to prevent a recurrance of the conditions of June 11th, when after a violent storm the discharge of the Bunn Creek exceeded the capacity of the spillway and two sections of the fill on the dam were washed away to the top of the core wall.

The plans provide for the enlargement of the spillway and the extension of the core wall to the top of the dam.

In accordance with the recommendations of your office I have assumed a maximum probable run-off of 400 cubic feet per second per square mile of catchment, which for this water shed area of 4.8 square miles will give a maximum probable discharge of 1920 cubic feet per second instead of 1340 cubic feet per second as provided for in my first plan. The plan for the spillway

CITY OF AMSTERDAM
DEPARTMENT OF PUBLIC WORKS
C. G. MESSINGER, COMMISSIONER
EDWARD H. PRENTICE, CITY ENGINEER

has been modified to accomodate 2000 feet per second. This is to be accomplished by widening the crest from 68 feet to 73 feet and lowering it from elevation 349.50 to 348.50, the top of the walls on either side being 353.50. This gives an increase in head from four feet as in the original plan to five feet. The shape of the spillway is that of a broad crested weir having an upstream slope of 8%. From the crest it slopes downward on a 1% grade for 20 feet; thence on a 4.37% grade for 20 feet; thence on a 10.25% grade for 40 feet; thence on an 18.62% grade for 95 feet, ending at a wall six feet in height built on bed rock foundation. Computed from the formula Q-- 2.46x73x5*, the discharge will be 2000 cubic feet per second. In plan the spillway shows a unifor contraction from the crest to a minimum width of 50 feet at a point 140 feet below the crest. The grade of the surface, however increases rapidly as shown above and the resulting increase in the velocity of flow will safely permit the use of this smaller cross sectional area.

The spillway is located easterly of the dam and is cut through a natural hill of stiff blue clay. It is proposed to construct concrete walls along the sides of the spillway as indicated on sheet M-27, and pave the area

CITY OF AMSTERDAM
DEPARTMENT OF PUBLIC WORKS
C. G. MESSINGER, COMMISSIONER
EDWARD H. PRENTICE, CITY ENGINEER

between them with 18 inches of rubble concrete. A masonry cut-off wall six feet in depth and four feet in width which is now built across the spillway entrance will be extended to the side walls.

It is also proposed to remove the present fill from the top of the core wall and extend the wall from elevation 549.62 to 553.5. This addition will extend the full length of the core wall which at present extends into the natural banks on each side, the lower strata of which is rock and the upper a stiff blue clay.

The addition to the wall is to be of rubble concrete two feet and a half at the bottom and two feet in width at the top as shown on sheet H-26.

Very truly yours,

City Engineer.

CONSULTING ENGINEERS AND LAND SURVEYORS

Associates
J. LANGAN
J. I. PHILLIPS
F. G. PFAU

Engineers
P. M. BEALL
E. J. CALOCERINOS
A. W. KUBIK
J. McWAIN
F. SPINA
R. L. SUTPHEN

F. DREHWING
A. KAUFMANN
D. LAURIA
D. D. RUSHEY
C. A. WILLIS

Land Surveyors
E. BEDWORTH
A. N. IANUZI, JR.
C. A. MAXEINER

1050 WEST GENESEE STREET
SYRACUSE, NEW YORK 13204
315-472-6251

June 17, 1965

Mr. E. C. Hudawalski, Asst. Superintendent
New York State Dept. of Public Works
1220 Washington Blvd.
Albany, New York

Attn: Mr. M. A. Beebe

Re: Amsterdam

File: 598.4

Gentlemen:

We are enclosing three applications for modifications to three reservoirs of the City of Amsterdam water system. Also enclosed are U.S.G.S. maps showing the locations of the existing structures and four sets of plans and specifications for the work proposed on these structures.

The Reservoirs are Steele Reservoir (Dam #343) and Cooks Reservoir both of which are on the Upper Hudson watershed and Brookside Reservoir (Dam #274 Serial #648) on the Mohawk watershed.

It is not proposed to significantly modify the discharge capacities of the spillways of Brookside or Steele Reservoirs but rather to strengthen the spillways and eliminate the possibility of failure of the dam due to the destruction of the spillway by flood flows.

In the case of Cooks Reservoir, the existing reservoir will be abandoned and the dam breached by excavating a "V" shaped trench through the dam.

... enclosed plans and return one approved
...

... any questions or comments relating to this
... not hesitate to contact the writer.

Very truly yours,

O'BRIEN & GERE

A. J. Kaufmann

A. J. Kaufmann, P.E.

...Attach

...

This reservoir is located at the top of Market Hill in the City of Amsterdam and it is about 1000 feet east of Market St. The reservoir was formed by building an earth dam, with a masonry and concrete core wall, across the valley of [illegible] Creek and it is used as a distributing reservoir in connection with the water supply of the City of Amsterdam.

It became necessary to repair this reservoir when part of the embankment on the upstream side of the dam slid into the reservoir when the water was being drawn down about Sept. 1, 1925.

The necessary repairs consisted of raising the top of the existing dam, flattening the slope on the upstream side, protecting this slope, building the existing head wall to a higher elevation to carry this flattened slope, cleaning out the silt from in front of the gate house, repointing the masonry and strengthening the gate house and resetting the bridge between the top of the dam and the gate house.

Plans for doing the above work were prepared by M. M. James, C. E. and approved by the Department of State Engineer and Surveyor on September 21, 1925. A contract for this work was let to the American Pipe & Construction Co. on September 22, 1925.

The same day that the contract was let the Contractor started the delivery of the plant and machinery. A force of men started removing the field stone rip-rap from the embankment the next day. This stone was stored outside of the line of the proposed embankment and was later placed as protection along the toe.

On Sept. 29th a steam shovel started excavating the material for forming the embankment from the borrow pit west of the reservoir. The greater part of this material was yellow clay with some sand mixed in but some of it was blue clay. The material was transported to the dam site at first in trucks but the greater part was hauled in wagons by teams.

To compact the material a steam roller was used for a time and then a lighter roller pulled by a tractor was used. The trucks and teams driving over the embankment also helped the compacting. The placing of the embankment was delayed by the rainy weather that was encountered during the period that this work was being done. This rain caused the roads to be impassable and made the material too wet to be handled. Although the rainfall delayed the work the repeated soakings of the embankment helped to make it compact. The forming of the embankment was carried on, the Contractor's force working two shifts each day that it was possible to work, until November 29th, when this part of the work was finished.

By October 5th a derrick had been set up and the excavation for the head wall and in front of the intake was started.

[illegible] used in doing this work. The excavation [illegible] in place so that concreting of the [illegible] 14th. [illegible] was delayed [illegible] resulting from the rainfall so that it was [illegible] before the head wall was finished. The head [illegible] 1-2-4 mixture of concrete, crushed stone [illegible] the coarse aggregate.

[illegible] of the embankment was in place so that it was possible [illegible] the building of the concrete slope protection that was [illegible] covered nearly all of the embankment. A piece of this [illegible]ion, which was 6" thick and made of 1-2-4 concrete, was [illegible] by November 20th. After this a rainy period so de[illegible] the work that it was not thought advisable to place any [illegible]oncrete protection because of the danger of it being damag[illegible] the cold weather.

The Common Council on December 1st authorized the substitu[illegible] of quarry stone rip-rap 18" thick for the 6" concrete pro[illegible]ction that was to have been placed.

More bad weather caused a delay so that it was Dec. 10th be[illegible]ore the laying of the quarry stone rip-rap started. The stone used in the rip-rap was run of the quarry limestone. The stones varied in weight from 25 lbs. to 2000 lbs. but I should say that 50% of the stone weighed between 100 lbs and 200 lbs. These stones were dumped on the top of the dam from trucks, moved down the bank by a crane with an orange peel bucket and placed by men. The voids between the larger stones were chinked up with the smaller stone.

Before either the concrete protection or the quarry stone was placed the embankment was covered with a 6" layer of crushed stone lining.

The work had advanced so that it was possible to start fill[illegible]ing the reservoir on December 15th. Except for the removal of the plant the work was entirely finished by December 21st.

The work on the gate house was carried on at various times while the other work was being donel

From a number of inspections made during the period that this work was being done I should saynthat in doing the work the plans and specifications were closely followed. It is my opinion that the work done was of a very good glass.

The work was carried on under the direction of M. E. James, C. E.

Respectfully submitted,

M. H. BROWN

January 8, 1926 Assistant Engineer

Form E-61A1 (2/62)

DEPARTMENT OF PUBLIC WORKS

DIVISION OF CONSTRUCTION

BUREAU OF WATERWAYS

ALBANY

Received June 18, 1965 | Dam No. 274

Disposition Details of Spillway reconstruction work approved July 2, 1965 | Watershed ~~MOHAWK~~ River

Serial No. 648

Foundation inspected ....

Structure inspected ....

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (Chapter 602, Laws of 1959) for the approval of specifications and detailed drawings, marked Contract W-1 - Modifications to Water Storage Reservoirs

herewith submitted for the { ~~construction~~ reconstruction } of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about August 1966
(Date)

1. The dam will be on Bunn Creek flowing into North Chuctanunda Creek in the ~~town~~ of Amsterdam County of Montgomery

between Market St & Elias St. 1.15 miles from Mohawk River
(Give exact distance and direction from a well-known bridge, dam, village, main cross-roads or mouth of a stream)

2. Location of dam is shown on the attached map or overlay of the Amsterdam quadrangle

... States Geological Survey at latitude 74° - 11' longitude 43° 57

... name of the owner is City of Amsterdam

... address of the owner is Amsterdam, N.Y.

... impounded water will be used for Distribution Reservoir for City Water Works

... part of the dam be built upon or its pond flood any State lands? No.

... 179 of the Conservation Law (~~see page five of this form~~) apply to the above named

... x... If answer is yes, give Conservation Department's assigned number for permit

... .

8. The area draining into the proposed pond or lake is .... acres; ......4.8...... square ...

9. The computed ......--...... year peak rate of runoff used in the design is ......--...... cu. ft. per ...

State criterion of method used in determining the peak rate of runoff ......----......

....

10. The maximum height of the proposed dam above the bed of the stream will be ..52... feet .... inches.

11. The designed maximum high water elevation above the spillcrest is computed to be ......--...... feet ......--...... inches; the designed freeboard as measured from the maximum high water elevation to the top of the proposed dam will be ..--........ feet ......--...... inches.

12. The open spillway of the proposed dam that will control the designed flood flow will be of ....

..Reinforced Concrete Pavement.......................... The width of the control section of
(State type, such as: vegetated earth, concrete, masonry, timber, rock filled crib, etc.)

the spillway, measured normal to the flow of water at the crest, will be ......78...... feet ......--...... inches in the clear; facing down stream, the waters will be held at the right end by a ......Concrete Wall...... the top of which will be ......5...... feet .... inches above the spillcrest, and have a top width of ......1...... feet ......6...... inches; and at the left end by a ..Concrete Wall.... the top of which will be ......5...... feet .... inches above the spillcrest and have a top width of ......1.... feet .... inches. The slope of the sides of the spillway will be Vert.. on .... (left) .... on .... (right).

13. The spillway is designed to safely discharge ....2700.......................... cu. ft. per sec.

14. The surface area of the proposed pond or lake will be ......13.8........ acres at the normal water elevation and ......13.8...... acres at the spillcrest elevation; the volume of the water impounded in the pond or lake will be 80,000,000...... gallons at the normal water elevation and ......-----...... gallons at the spillcrest elevation.

15a. The normal water elevation of the proposed pond or lake will be ......0...... feet .... inches below the spillway crest, and will be maintained by means of a ..Diversion Conduit..........; the pond or lake will be drained by means of a..........14" outlet pipe..........................; provision will be made for supplying water to riparian owners downstream, during dry seasons, by means of ....--..

15b. In addition to normal water control, provision must be made for a bottom draw-off if the pond is on a trout stream of constant flow. The draw-off will be by means of a ....----.........., designed to maintain an outflow of one-half of the minimum inflow of the stream of ......--...... cu. ft. per sec. up to a maximum outflow of one cu. ft. per sec.

16. The maximum discharge through the spillway that controls the normal water elevation will be ....--...... cu. ft. per sec. during maximum high water.

17. If flashboards are to be used to control flood flow they must be of the automatic or self-tilting type, designed to fail or otherwise permit full discharge through the spillway when the flood waters reach a height of ...--... feet ...-... inches above the spillcrest.

18. If an overfall structure is used as a spillway, it shall be provided with an apron constructed of ....; the thickness of the .... will be .... feet .... inches, the width .... feet .... inches across the stream and the length .... feet .... inches parallel to the stream.

19. Facing downstream, what is the nature of material composing the right bank? ....

Reported to be "loam clay"

20. Facing downstream, what is the nature of the material composing the left bank? ....

Reported to be "loam clay"

21. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) "Bed of original Creek Rock"

22. Are there any porous seams or fissures beneath the foundation of the proposed dam? "no"

23. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. ....

"Banks loam clay Stands up very steep slope; impervious"

Previous Records

24. Was the above soil information obtained from soil borings? --; test pits? --

25. State how much above the spillcrest elevation is the lowest part of the immediate upstream adjoining property or properties, 30+ feet .... inches.

26. Does this proposed pond or lake constitute any part of a public water supply? Yes

27. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam Yes

28. The design, plans and specifications have been prepared under the supervision of: (Sign on applicable line below).

(a) Walter R. [signature] .... P. E. License No. 30988
(Signature)

Address 1050 West Genesee Street, Syracuse, New York 13204

(b) .... U. S. D. A. Soil Conservation Service
(Signature) (Title: Engineer or Conservationist)

(c) .... N. Y. S. Conservation Department Engineer
(Signature) (Title)

(d) .... Other qualified engineer.
(Signature) (Title)

29. The ....REPAIRS.................... will be under the supervision of: (Sign on applicable line below).
(State which: Erection, Reconstruction or Repairs)

(a) ......[illegible signature]...................... P. E. License No. ....30938........
(Signature)

Address ....1050 West Genesee Street, Syracuse, N.Y. 13204........................

(b) .... U. S. D. A. Soil Conservation Service
(Signature) (Title: Engineer or Conservationist)

(c) .... N. Y. S. Conservation Department Engineer
(Signature) (Title)

(d) .... Other qualified engineer.
(Signature) (Title)

The foregoing information is correct to the best of my knowledge and belief, and the construction will be carried out in accordance with the approved plans and specifications.

........City of Amsterdam, N.Y............................, Owner

By ......James M. Donnelly, City Administrator, authorized agent of owner.

Address of signer .....Amsterdam, N.Y.......................... Date June 15, 1966

INSTRUCTIONS

Read carefully, the law setting forth the requirements to be complied with in order to construct or reconstruct a dam.

Determine first whether the stream, across which the dam is to be erected or from which water for the proposed pond or lake is to be diverted, is under the jurisdiction of the Conservation Department. This information may be obtained upon request from the manager of the District Fisheries Office of the Conservation Department which has jurisdiction in the County where the stream is located, the Conservation Department, Bureau of Fish, State Campus Site, Albany 1, New York or the New York State Department of Public Works, Bureau of Waterways, Albany 1, New York.

Before a dam may be erected across a natural water-course, the riparian rights of other land owners (both upstream and downstream) must be considered and customarily their consent be obtained as such rights have been adjudged by the civil courts to be inalienable and inviolate.

The elevation of the impounded water should be maintained at a suitable level below the lowest contour of the adjoining properties thereby preventing inundation of the properties during the highest stage of the waters.

Each application for the construction or reconstruction of a dam must be made on this standard form, copies of which will be furnished upon request to the New York State Department of Public Works, Bureau of Waterways, Albany 1, New York. The application, properly executed, must be accompanied by three sets of plans and specifications. The plans must contain the following information:

a. A topographical plan (with contours) of the impounded area drawn to a suitable scale.

b. A profile and transverse section of the impounded area showing the proposed excavation, the normal water and possible high water elevations. A 1'-0" minimum of freeboard is to be provided between the top of the dam and the possible high water.

c. A longitudinal elevation and transverse section of the dam with all the necessary details of the related appurtenances, spillways, drains, etc.

d. A log of the soil information. Samples of the materials to be used in the dam and of the material upon which the dam is to be founded may be asked for, but need not be furnished unless requested.

No work of construction, reconstruction or repairs of the structure or structures shall be started until after the plans and specifications have been formally approved by the New York State Department of Public Works.

If the dam constitutes a part of a public water supply, application should also be made to the Water Resources Commission under Article V of the Conservation Law, as amended.

An application for the construction or reconstruction of a dam must be signed by the prospective owner of the dam or his duly authorized agent. The address of the signer and the date must be given as provided for in this application form.

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

[redacted]

DESIGN BRIEF

DESIGNED BY: JPG — DATE: 7.6.78

CHECKED BY: — PAGE: C-1 OF

PROJECT NO.: 2210 — SHORT TITLE: NY DAM INSPECTIONS

DESIGN SUBJECT: BROOKSIDE DAM — REF. DWGS.

ESTIMATOR OF Tc (BPR)

$$Tc = (11.9\ L^3/H)^{.385} = (11.9\ (5.068)^3/220)^{.385} = 2.120\ \text{HR}$$

SCS

$$L = \frac{\ell^{.8}\ (S+1)^{.7}}{1900\,(Y^{.5})} = \frac{\overset{3483}{(26760)^{.8}}\ \overset{2.790}{(3.33+1)^{.7}}}{1900\ (4.0)^{.5}}$$

$$S = \frac{1000}{CN} - 10 = 3.33$$

$$= \frac{9716.17}{3800} = 2.557$$

$$Tc = L/.6 = 2.557/.6 = 4.261\ \text{HR}$$

North Atlantic Division Water Resources Study February, 1972

$$Tc + R = 10\ (a)\ (DA/S)^{.38} = 8.528$$

$$R/(Tc+R) = 0.50$$

$$R = 8.528 \times 0.50 = 4.264$$

$$Tc = 8.528 - 4.264 = 4.264$$

Mohawk and Upper Hudson Report, N.Y. DEC 1977

$$(TC+R) = 7.52 * A^{.215} * St^{.425}$$

$$= 10.19 * 1.03 = 10.52$$

$$A = 4.1$$

$$St = 1.08$$

$$R = 3.30 * A^{.155} * St^{.775}$$

$$= 4.11 * 1.06 = 4.36$$

$$TC + 4.36 = 10.52$$

$$TC = 6.16$$

DALE

DESIGN BRIEF

DESIGNED BY N.D. DATE 7-7-78

CHECKED BY PAGE C-2 OF

PROJECT NO. 2210 SHORT TITLE N.Y. Dam Inspections

DESIGN SUBJECT Brookside Dam REF. DWGS.

Summary of Estimates of Clark Parameters

BPR - T_c = 2.120 hours

SCS (CN Method) T_c = 4.261 hours

North Atlantic Div.

Study T_c = 4.264 hours

Mohawk and Upper Hudson

Report T_c = 6.24 hours

Use North Atlantic Div. Results for T_c and R estimate of Clark parameters

T_c = 4.264

R = 4.264

DALE

DESIGN BRIEF

DESIGNED BY H.D. DATE 7-7-78

CHECKED BY PAGE C-3 OF

PROJECT NO. 2210 SHORT TITLE N.Y. Dam Inspection

DESIGN SUBJECT Brookside Dam REF. DWGS.

D-A-D Relationship *

Drainage Area less than 10 sq. mi.
use values for 10 sq. mi.

Duration	Depth	% of Index
6 HR	24.0	112
12 HR	27.5	128
24 HR	29.5	137
48 HR	33.0	153
72 HR	34.0	158

PMP Index Rainfall **

21.5

Base Flow

Estimate 2 cubic feet per sec per sq mi

Base Flow = 2 × 4.1 = 8.2 Say 8.0 cfs

Loss Rates

Initial Loss 1.0 in.
Constant Loss 0.1 in-/hr.

* From Hydrometeorological Report No. 51
** Index Rainfall - estimate for 24 hour duration for area of 200 mi²

DALE

DESIGN BRIEF

DESIGNED BY ND

DATE 7-12-79

CHECKED BY

PAGE C-4 OF

PROJECT NO. 2210 SHORT TITLE NY DAM INSPECTIONS

DESIGN SUBJECT BROOKSIDE DAM

REF. DWGS.

HEC-1 COMP COMPUTER RUNS RESULTS

(Flows prior to routing thru spillway)

RUN NO	DESCRIPTION	PEAK	PAGES
1	PMF	5900	5-7
2	SPF	3000	8-10

```
SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)       1
ENTER TIME INTERVAL(MIN)=    60.


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)       2
ENTER DRAINAGE AREA (SQMI) =        4.10
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )          2
ENTER NUMBER OF TIME-AREA ORDINATES (0=NONE)=        0
ENTER CLARKS TC AND R (HRS) =          4.26        4.26

       TP        CP        TC        R

     3.82     0.551      4.26      4.26


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)       3
ENTER RATIO  IMPERVIOUS =          0.00
SELECT 1-3 ( 1=RAIN, 2=SPS, 3=PMS )        3
ENTER PMS INDEX RAINFALL (IN) = 21.50
ENTER R6,R12,R24,R48,R72,R96 =      112.00  128.00  137.00  153.00  158.00
ENTER TRSPC AND TRSDA (SQMI) =            0.00       4.10
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS)        1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) =      1.00       0.10


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)       4
ENTER A TITLE PLEASE -   BROOKSIDE -PMF
ENTER STRTQ,QRCSN,AND RTIOR =          8.00      8.00      1.00
```

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.01	0.01	0.00	45.	8.	8.
2	0	0.01	0.01	0.00	162.	8.	8.
3	0	0.01	0.01	0.00	298.	8.	8.
4	0	0.01	0.01	0.00	381.	8.	8.
5	0	0.01	0.01	0.00	364.	8.	8.
6	0	0.01	0.01	0.00	294.	8.	8.
7	0	0.05	0.05	0.00	232.	8.	8.
8	0	0.05	0.05	0.00	184.	8.	8.
9	0	0.05	0.05	0.00	145.	8.	8.
10	0	0.05	0.05	0.00	115.	8.	8.
11	0	0.05	0.05	0.00	91.	8.	8.
12	0	0.05	0.05	0.00	72.	8.	8.
13	0	0.22	0.22	0.00	57.	8.	8.
14	0	0.26	0.26	0.00	45.	8.	8.
15	0	0.32	0.21	0.11	36.	8.	13.
16	0	0.82	0.10	0.72	28.	8.	58.
17	0	0.30	0.10	0.20	22.	8.	166.
18	0	0.24	0.10	0.14	18.	8.	303.
19	0	0.02	0.02	0.00	14.	8.	405.
20	0	0.02	0.02	0.00	11.	8.	421.
21	0	0.02	0.02	0.00	9.	8.	371.
22	0	0.02	0.02	0.00	7.	8.	305.
23	0	0.02	0.02	0.00	6.	8.	244.
24	0	0.02	0.02	0.00	5.	8.	194.

25	0	0.10	0.10	0.00	4.	8.	155.
26	0	0.10	0.10	0.00	5.	8.	124.
27	0	0.10	0.10	0.00		8.	100.
28	0	0.10	0.10	0.00		8.	81.
29	0	0.10	0.10	0.00		8.	66.
30	0	0.10	0.10	0.00		8.	54.
31	0	0.44	0.10	0.34		8.	59.
32	0	0.44	0.10	0.34		8.	107.
33	0	0.44	0.10	0.34		8.	203.
34	0	0.44	0.10	0.34		8.	327.
35	0	0.44	0.10	0.34		8.	448.
36	0	0.44	0.10	0.34		8.	545.
37	0	1.84	0.10	1.74		8.	684.
38	0	2.21	0.10	2.11		8.	988.
39	0	2.77	0.10	2.67		8.	1538.
40	0	7.01	0.10	6.91		8.	2500.
41	0	2.58	0.10	2.48		8.	3837.
42	0	2.03	0.10	1.93		8.	5140.
43	0	0.15	0.10	0.05		8.	5918.
44	0	0.15	0.10	0.05		8.	5828.
45	0	0.15	0.10	0.05		8.	5103.
46	0	0.15	0.10	0.05		8.	4196.
47	0	0.15	0.10	0.05		8.	3357.
48	0	0.15	0.10	0.05		8.	2683.
49	0	0.00	0.00	0.00		8.	2149.
50	0	0.00	0.00	0.00		8.	1721.
51	0	0.00	0.00	0.00		8.	1374.
52	0	0.00	0.00	0.00		8.	1092.
53	0	0.00	0.00	0.00		8.	867.
54	0	0.00	0.00	0.00		8.	689.
55	0	0.02	0.02	0.00		8.	548.
56	0	0.02	0.02	0.00		8.	436.
57	0	0.02	0.02	0.00		8.	348.
58	0	0.02	0.02	0.00		8.	278.
59	0	0.02	0.02	0.00		8.	222.
60	0	0.02	0.02	0.00		8.	178.
61	0	0.07	0.07	0.00		8.	144.
62	0	0.08	0.08	0.00		8.	116.
63	0	0.10	0.10	0.00		8.	91.
64	0	0.26	0.10	0.16		8.	77.
65	0	0.09	0.09	0.00		8.	77.
66	0	0.07	0.07	0.00		8.	73.
67	0	0.01	0.01	0.00		8.	77.
68	0	0.01	0.01	0.00		8.	68.
69	0	0.01	0.01	0.00		8.	56.
70	0	0.01	0.01	0.00		8.	46.
71	0	0.01	0.01	0.00		8.	38.
72	0	0.01	0.01	0.00		8.	32.
73	0					8.	27.
74	0					8.	23.
75	0					8.	19.
76	0					8.	17.
77	0					8.	15.
78	0					8.	14.
79	0					8.	13.
80	0					8.	12.

81	0					8.	11.
82	0					8.	10.
83	0					8.	10.
84	0					8.	9.
85	0					8.	9.
86	0					8.	9.
87	0					8.	9.
88	0					8.	9.
89	0					8.	8.
90	0					8.	8.
91	0					8.	8.
92	0					8.	8.
93	0					8.	8.
94	0					8.	8.
95	0					8.	8.
96	0					8.	8.
97	0					8.	8.
TOTAL		26.07	4.56	21.51	2647.	776.	57715.

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)

```
SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      1
ENTER TIME INTERVAL(MIN)=   60.


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      2
ENTER DRAINAGE AREA (SQMI) =       4.10
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )         2
ENTER NUMBER OF TIME-AREA ORDINATES (0=NONE)=      0
ENTER CLARKS TC AND R (HRS) =         4.26       4.26

       TP       CP       TC       R

     3.82    0.551     4.26     4.26


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      3
ENTER RATIO  IMPERVIOUS =         0.00
SELECT 1-3 ( 1=RAIN, 2=SPS, 3=PMS )        2
ENTER SPS INDEX RAINFALL (IN) = 10.75
ENTER TRSFC AND TRSDA (SQMI) =           1.00       4.10
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS)       1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) =       1.00       0.10


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      4
ENTER A TITLE PLEASE -   BROOKSIDE -SPF
ENTER STRTQ,QRCSN,AND RTIOR =         8.00      8.00      1.00

 HR MIN  RAIN   LOSS  EXCESS   UNIT HG    RECSN     FLOW
  1   0  0.00   0.00   0.00      45.         8.        8.
  2   0  0.00   0.00   0.00     162.         8.        8.
  3   0  0.00   0.00   0.00     298.         8.        8.
  4   0  0.00   0.00   0.00     381.         8.        8.
  5   0  0.00   0.00   0.00     364.         8.        8.
  6   0  0.00   0.00   0.00     294.         8.        8.
  7   0  0.01   0.01   0.00     232.         8.        8.
  8   0  0.01   0.01   0.00     184.         8.        8.
  9   0  0.01   0.01   0.00     145.         8.        8.
 10   0  0.01   0.01   0.00     115.         8.        8.
 11   0  0.01   0.01   0.00      91.         8.        8.
 12   0  0.01   0.01   0.00      72.         8.        8.
 13   0  0.03   0.03   0.00      57.         8.        8.
 14   0  0.03   0.03   0.00      45.         8.        8.
 15   0  0.04   0.04   0.00      36.         8.        8.
 16   0  0.11   0.11   0.00      28.         8.        8.
 17   0  0.04   0.04   0.00      22.         8.        8.
 18   0  0.03   0.03   0.00      18.         8.        8.
 19   0  0.00   0.00   0.00      14.         8.        8.
 20   0  0.00   0.00   0.00      11.         8.        8.
 21   0  0.00   0.00   0.00       9.         8.        8.
 22   0  0.00   0.00   0.00       7.         8.        8.
 23   0  0.00   0.00   0.00       6.         8.        8.
 24   0  0.00   0.00   0.00       5.         8.        8.
 25   0  0.01   0.01   0.00       4.         8.        8.
 26   0  0.01   0.01   0.00       3.         8.        8.
 27   0  0.01   0.01   0.00                  8.        8.
 28   0  0.01   0.01   0.00                  8.        8.
```

29	0	0.01	0.01	0.00	8.	8.
30	0	0.01	0.01	0.00	8.	8.
31	0	0.03	0.03	0.00	8.	8.
32	0	0.03	0.03	0.00	8.	8.
33	0	0.03	0.03	0.00	8.	8.
34	0	0.03	0.03	0.00	8.	8.
35	0	0.03	0.03	0.00	8.	8.
36	0	0.03	0.03	0.00	8.	8.
37	0	0.13	0.13	0.00	8.	8.
38	0	0.15	0.15	0.00	8.	8.
39	0	0.19	0.17	0.02	8.	9.
40	0	0.48	0.10	0.38	8.	28.
41	0	0.18	0.10	0.08	8.	79.
42	0	0.14	0.10	0.04	8.	144.
43	0	0.02	0.02	0.00	8.	190.
44	0	0.02	0.02	0.00	8.	195.
45	0	0.02	0.02	0.00	8.	169.
46	0	0.02	0.02	0.00	8.	138.
47	0	0.02	0.02	0.00	8.	111.
48	0	0.02	0.02	0.00	8.	89.
49	0	0.08	0.08	0.00	8.	72.
50	0	0.08	0.08	0.00	8.	59.
51	0	0.08	0.08	0.00	8.	48.
52	0	0.08	0.08	0.00	8.	40.
53	0	0.08	0.08	0.00	8.	33.
54	0	0.08	0.08	0.00	8.	28.
55	0	0.26	0.10	0.16	8.	31.
56	0	0.26	0.10	0.16	8.	54.
57	0	0.26	0.10	0.16	8.	99.
58	0	0.26	0.10	0.16	8.	158.
59	0	0.26	0.10	0.16	8.	214.
60	0	0.26	0.10	0.16	8.	260.
61	0	0.98	0.10	0.88	8.	328.
62	0	1.17	0.10	1.07	8.	482.
63	0	1.46	0.10	1.36	8.	763.
64	0	3.71	0.10	3.61	8.	1260.
65	0	1.37	0.10	1.27	8.	1955.
66	0	1.07	0.10	0.97	8.	2635.
67	0	0.15	0.10	0.05	8.	3042.
68	0	0.15	0.10	0.05	8.	3000.
69	0	0.15	0.10	0.05	8.	2632.
70	0	0.15	0.10	0.05	8.	2175.
71	0	0.15	0.10	0.05	8.	1754.
72	0	0.15	0.10	0.05	8.	1416.
73	0	[illegible]	0.00	0.00	8.	1147.
74	0	[illegible]	[illegible]	0.00	8.	928.
75	0	[illegible]	[illegible]	[illegible]	8.	747.
76	0	[illegible]	[illegible]	[illegible]	8.	596.
77	0	[illegible]	0.00	0.00	8.	474.
78	0	[illegible]	[illegible]	0.00	8.	377.

79	0	0.01	0.01	0.00		8.	301.
80	0	0.01	0.01	0.00		8.	240.
81	0	0.01	0.01	0.00		8.	192.
82	0	0.01	0.01	0.00		8.	154.
83	0	0.01	0.01	0.00		8.	124.
84	0	0.01	0.01	0.00		8.	100.
85	0	0.05	0.05	0.00		8.	82.
86	0	0.06	0.06	0.00		8.	67.
87	0	0.07	0.07	0.00		8.	53.
88	0	0.10	0.10	0.00		8.	46.
89	0	0.07	0.07	0.00		8.	47.
90	0	0.05	0.05	0.00		8.	45.
91	0	0.01	0.01	0.00		8.	47.
92	0	0.01	0.01	0.00		8.	42.
93	0	0.01	0.01	0.00		8.	36.
94	0	0.01	0.01	0.00		8.	30.
95	0	0.01	0.01	0.00		8.	25.
96	0	0.01	0.01	0.00		8.	21.
97	0					8.	18.
98	0					8.	16.
99	0					8.	14.
100	0					8.	13.
101	0					8.	12.
102	0					8.	11.
103	0					8.	11.
104	0					8.	10.
105	0					8.	10.
106	0					8.	9.
107	0					8.	9.
108	0					8.	9.
109	0					8.	9.
110	0					8.	9.
111	0					8.	8.
112	0					8.	8.
113	0					8.	8.
114	0					8.	8.
115	0					8.	8.
116	0					8.	8.
117	0					8.	8.
118	0					8.	8.
119	0					8.	8.
120	0					8.	8.
121	0					8.	8.
TOTAL		15.28	4.25	11.03	2647.	968.	30166.

BROOKSIDE (DRAWDOWN)

DIAMETER OF PIPE (FT) 1.16
START ELEV OF PIPE (FT) 305.00
ROUGH COEFFICIENT 0.0140
HEIGHT-HEAD (FT) 70.00
PIPE LENGTH (FT) 300.00

KT,KG,KENT,KEXT 9.94 8.84 0.10 1.00

C 0.317

ELEV	HEIGHT	G2gH	(2gH)**1/2	Q/C	Q
306	1.00	64.40	8.02	8.48	2.69
307	2.00	128.80	11.35	11.99	3.80
308	3.00	193.20	13.90	14.69	4.66
309	4.00	257.60	16.05	16.96	5.38
310	5.00	322.00	17.94	18.96	6.01
311	6.00	386.40	19.66	20.77	6.59
312	7.00	450.80	21.23	22.44	7.12
313	8.00	515.20	22.70	23.99	7.61
314	9.00	579.60	24.07	25.44	8.07
315	10.00	644.00	25.38	26.82	8.51
316	11.00	708.40	26.62	28.13	8.92
317	12.00	772.80	27.80	29.38	9.32
318	13.00	837.20	28.93	30.58	9.70
319	14.00	901.60	30.03	31.73	10.06
320	15.00	966.00	31.08	32.85	10.42
321	16.00	1030.40	32.10	33.92	10.76
322	17.00	1094.80	33.09	34.97	11.09
323	18.00	1159.20	34.05	35.98	11.41
324	19.00	1223.60	34.98	36.97	11.72
325	20.00	1288.00	35.89	37.93	12.03
326	21.00	1352.40	36.77	38.86	12.33
327	22.00	1416.80	37.64	39.78	12.62
328	23.00	1481.20	38.49	40.67	12.90
329	24.00	1545.60	39.31	41.55	13.18
330	25.00	1610.00	40.12	42.41	13.45
331	26.00	1674.40	40.92	43.24	13.72
332	27.00	1738.80	41.70	44.07	13.98
333	28.00	1803.20	42.46	44.88	14.23
334	29.00	1867.60	43.22	45.67	14.49
335	30.00	1932.00	43.95	46.45	14.73
336	31.00	1996.40	44.68	47.22	14.98
337	32.00	2060.80	45.40	47.98	15.22
338	33.00	2125.20	46.10	48.72	15.45
339	34.00	2189.60	46.79	49.45	15.68
340	35.00	2254.00	47.48	50.17	15.91
341	36.00	2318.40	48.15	50.89	16.14
342	37.00	2382.80	48.81	51.59	16.36
343	38.00	2447.20	49.47	52.28	16.58
344	39.00	2511.60	50.12	52.96	16.80
345	40.00	2576.00	50.75	53.64	17.01
346	41.00	2640.40	51.38	54.31	17.22
347	42.00	2704.80	52.01	54.96	17.43
348	43.00	2769.20	52.62	55.61	17.64
349	44.00	2833.60	53.23	56.26	17.84
350	45.00	2898.00	53.83	56.89	18.04

353	48.00	3091.20	55.60	58.76	18.64
354	49.00	3155.60	56.17	59.37	18.83
355	50.00	3220.00	56.75	59.97	19.02
356	51.00	3284.40	57.31	60.57	19.21
357	52.00	3348.80	57.87	61.16	19.40
358	53.00	3413.20	58.42	61.74	19.58
359	54.00	3477.60	58.97	62.32	19.77
360	55.00	3542.00	59.51	62.90	19.95
361	56.00	3606.40	60.05	63.47	20.13
362	57.00	3670.80	60.59	64.03	20.31
363	58.00	3735.20	61.12	64.59	20.48
364	59.00	3799.60	61.64	65.14	20.66
365	60.00	3864.00	62.16	65.69	20.84
366	61.00	3928.40	62.68	66.24	21.01
367	62.00	3992.80	63.19	66.78	21.18
368	63.00	4057.20	63.70	67.32	21.35
369	64.00	4121.60	64.20	67.85	21.52
370	65.00	4186.00	64.70	68.38	21.69
371	66.00	4250.40	65.20	68.90	21.85
372	67.00	4314.80	65.69	69.42	22.02
373	68.00	4379.20	66.18	69.94	22.18
374	69.00	4443.60	66.66	70.45	22.34
375	70.00	4508.00	67.14	70.96	22.50

BROOKSIDE (UPPER DIV)

DIAMETER OF PIPE (FT) 3.00
START ELEV OF PIPE (FT) 297.00
ROUGH COEFFICIENT 0.0140
HEIGHT-HEAD (FT) 15.00
PIPE LENGTH (FT) 2100.00

KT,KG,KENT,KEXT 18.59 17.49 0.10 1.00

C 0.232

ELEV	HEIGHT	G2gH	(2gH)**1/2	Q/C	Q
298	1.00	64.40	8.02	56.73	13.16
299	2.00	128.80	11.35	80.22	18.61
300	3.00	193.20	13.90	98.25	22.79
301	4.00	257.60	16.05	113.45	26.31
302	5.00	322.00	17.94	126.84	29.42
303	6.00	386.40	19.66	138.95	32.23
304	7.00	450.80	21.23	150.08	34.81
305	8.00	515.20	22.70	160.44	37.21
306	9.00	579.60	24.07	170.18	39.47
307	10.00	644.00	25.38	179.38	41.60
308	11.00	708.40	26.62	188.14	43.63
309	12.00	772.80	27.80	196.50	45.58
310	13.00	837.20	28.93	204.53	47.44
311	14.00	901.60	30.03	212.25	49.23
312	15.00	966.00	31.08	219.70	50.95

BROOKSIDE (LOWER DIV)

DIAMETER OF PIPE (FT) 8.00
START ELEV OF PIPE (FT) 295.00
ROUGH COEFFICIENT 0.0150
HEIGHT-HEAD (FT) 15.00
PIPE LENGTH (FT) 1800.00

KT,KG,KENT,KEXT 5.77 4.67 0.10 1.00

C 0.416

ELEV	HEIGHT	62gH	(2gH)**1/2	Q/C	Q
296	1.00	64.40	8.02	403.38	167.94
297	2.00	128.80	11.35	570.46	237.51
298	3.00	193.20	13.90	698.67	290.88
299	4.00	257.60	16.05	806.76	335.88
300	5.00	322.00	17.94	901.98	375.53
301	6.00	386.40	19.66	988.07	411.37
302	7.00	450.80	21.23	1067.24	444.33
303	8.00	515.20	22.70	1140.93	475.01
304	9.00	579.60	24.07	1210.13	503.83
305	10.00	644.00	25.38	1275.59	531.08
306	11.00	708.40	26.62	1337.85	557.00
307	12.00	772.80	27.80	1397.34	581.77
308	13.00	837.20	28.93	1454.40	605.52
309	14.00	901.60	30.03	1509.30	628.38
310	15.00	966.00	31.08	1562.28	650.44

AMSTERDAM (BROOKSIDE)
WEIR FLOW PROGRAM

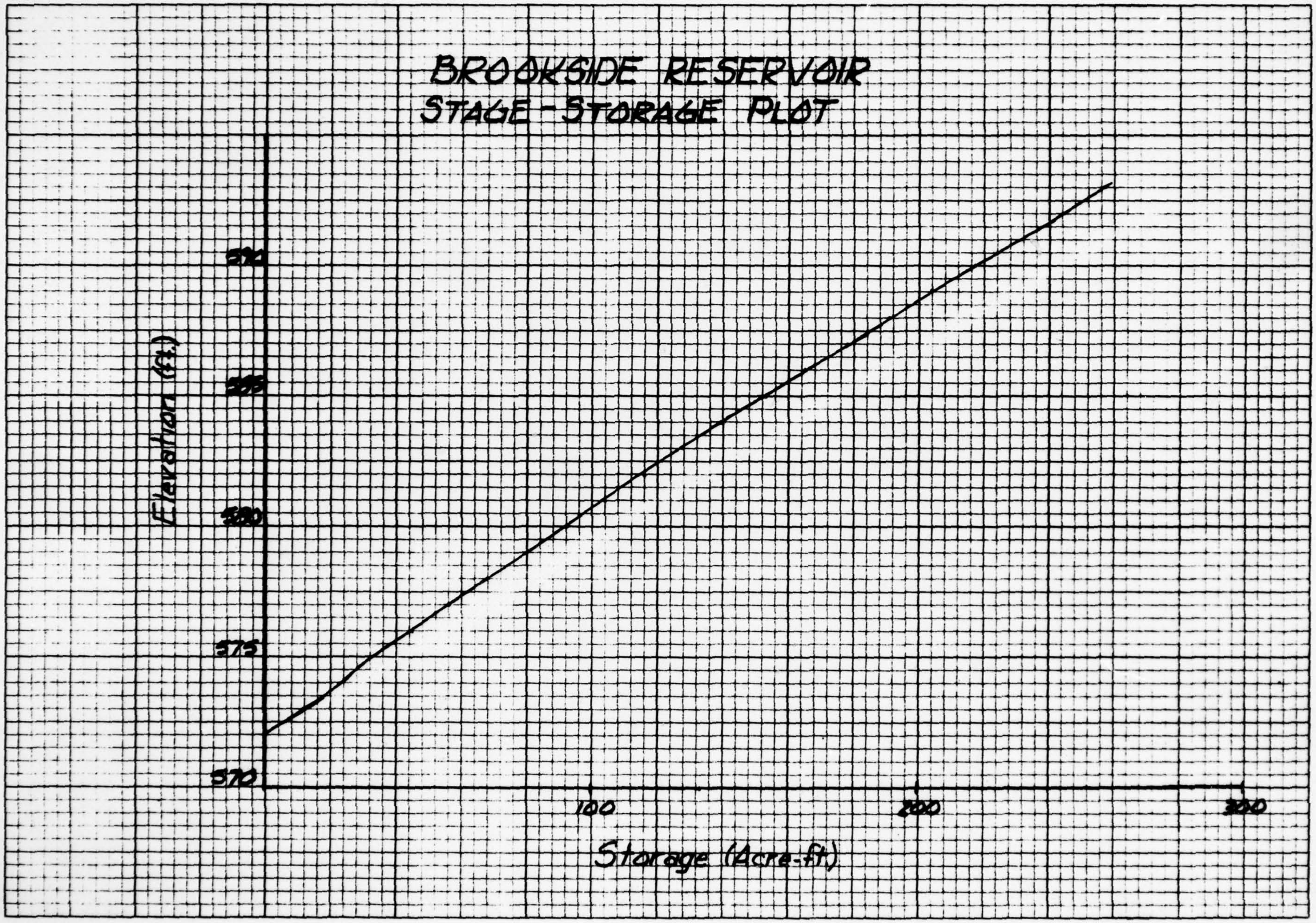
GIVE C,L 3.20 65.00
GIVE ELEVATION TO START FLOW AND HEIGHT 57[illegible] 20

ELEV	57[illegible]	FT	DISCHARGE	20[illegible].	CFS
ELEV	574	FT	DISCHARGE	588.	CFS
ELEV	575	FT	DISCHARGE	1081.	CFS
ELEV	576	FT	DISCHARGE	1664.	CFS
ELEV	577	FT	DISCHARGE	2326.	CFS
ELEV	578	FT	DISCHARGE	3057.	CFS
ELEV	579	FT	DISCHARGE	3852.	CFS
ELEV	580	FT	DISCHARGE	4706.	CFS
ELEV	581	FT	DISCHARGE	5616.	CFS
ELEV	582	FT	DISCHARGE	6578.	CFS
ELEV	583	FT	DISCHARGE	7588.	CFS
ELEV	584	FT	DISCHARGE	8646.	CFS
ELEV	585	FT	DISCHARGE	9749.	CFS
ELEV	586	FT	DISCHARGE	10896.	CFS
ELEV	587	FT	DISCHARGE	12084.	CFS
ELEV	588	FT	DISCHARGE	13312.	CFS
ELEV	589	FT	DISCHARGE	14579.	CFS
ELEV	590	FT	DISCHARGE	15884.	CFS
ELEV	591	FT	DISCHARGE	17226.	CFS
ELEV	592	FT	DISCHARGE	18604.	CFS

AMSTERDAM (BROOKSIDE)
WEIR FLOW PROGRAM

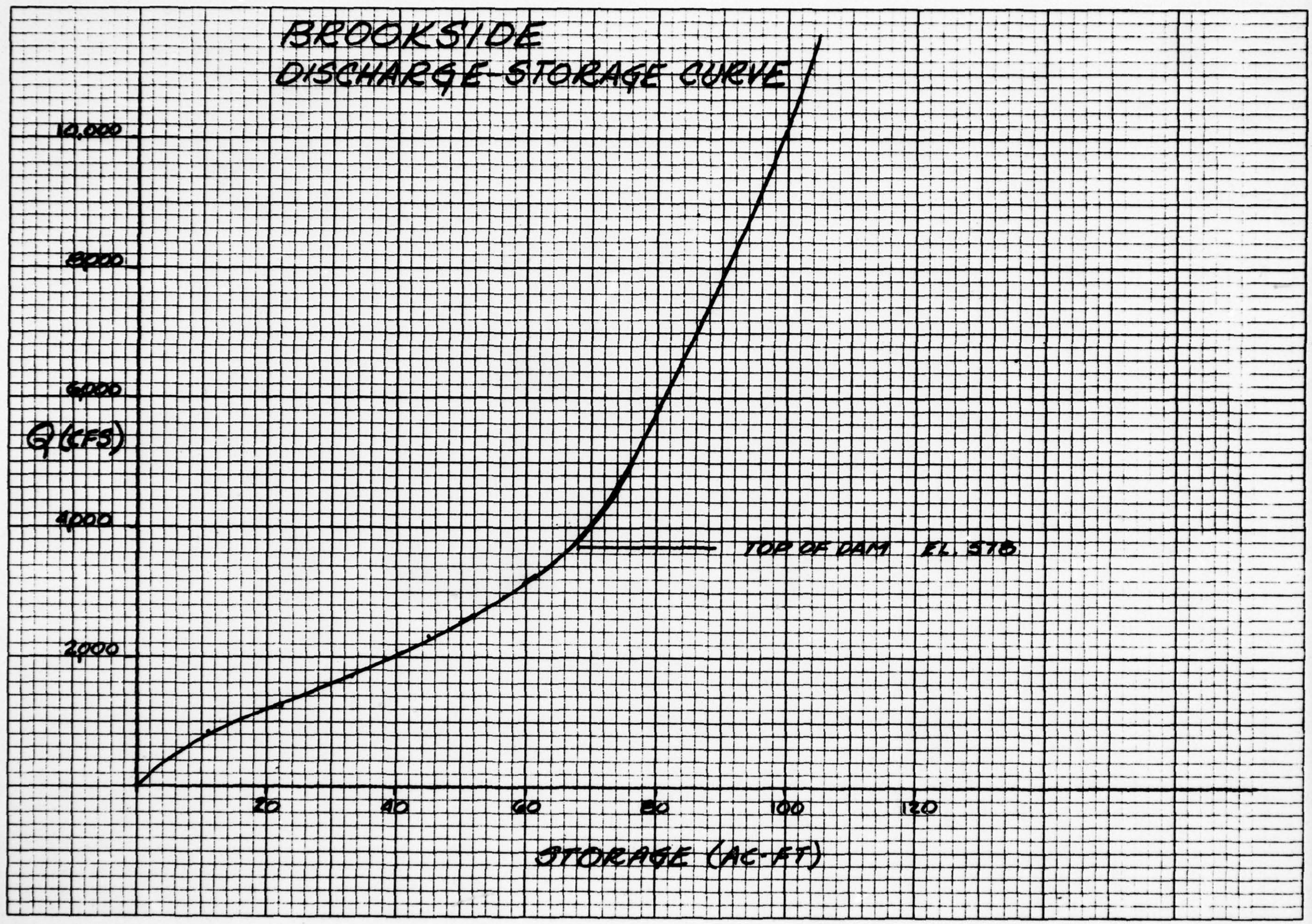
GIVE C,L 2.64 500.00
GIVE ELEVATION TO START FLOW AND HEIGHT 578 14

ELEV	579	FT	DISCHARGE	1320.	CFS
ELEV	580	FT	DISCHARGE	3734.	CFS
ELEV	581	FT	DISCHARGE	6859.	CFS
ELEV	582	FT	DISCHARGE	10560.	CFS
ELEV	583	FT	DISCHARGE	14758.	CFS
ELEV	584	FT	DISCHARGE	19400.	CFS
ELEV	585	FT	DISCHARGE	24447.	CFS
ELEV	586	FT	DISCHARGE	29868.	CFS
ELEV	587	FT	DISCHARGE	35640.	CFS
ELEV	588	FT	DISCHARGE	41742.	CFS
ELEV	589	FT	DISCHARGE	48157.	CFS
ELEV	590	FT	DISCHARGE	54871.	CFS
ELEV	591	FT	DISCHARGE	61871.	CFS
ELEV	592	FT	DISCHARGE	69146.	CFS


BROOKSIDE RESERVOIR
STAGE - STORAGE PLOT
Elevation (ft.)
570
575
580
585
590
100
200
300
Storage (Acre-ft)

FROM CREST OF SPILLWAY (INCL. TWO DIVERSIONS)

NAME	ELEV.	H	Q UPPER DIVERSION	Q LOWER DIVERSION	Q EMERG. SPWY	Q DAM	Q TOT.
BROOKSIDE	572						
	573	1	44	606	208	—	858
NOTE:	574	2			588	—	1238
INV. LOW DIV. = 577 WITH 13 HEAD	575	3			1081	—	1731
	576	4			1664	—	2314
IN UPPER DIV. = 579 WITH 1. HEAD	577	5			2326	—	2976
	578	6			3057	—	3707
	579	7			3852	1320	5822
	580	8				3734	8236
	581	9				6859	11361
	582	10				10560	15062
	583	11				14758	19260
	584	12				19400	23902
	585	13				24447	28949
	586	14				29868	34370
	587	15				35640	40142
	588	16				41742	46244
	589	17				48157	52659
	590	18				54871	59373


BROOKSIDE
DISCHARGE-STORAGE CURVE
10,000
8000
6000
Q (CFS)
4000
2000
TOP OF DAM EL. 578
20
40
60
80
100
120
STORAGE (AC-FT)

HEC-1

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OLD NY160PM
LNHFF
00100 A BROOKSIDE DAM
0110 A RESERVOIR ROUTING OF PMF OVER STRUCTURE
0120 A INCLUDES EMERGENCY SPILLWAY UPPER DIV AND LOWER DEV
0130 B     40        1
0140 1      3
0150 K
0160 M     -1            4.1
0170 M     54       59      107      203      327      440      545      604      900     1530
0200 M   2500     3037     5140     5918     5020     5103     4196     3357     2603     2149
0210 M   1721     1374     1092      867      609      540      436      340      278      222
0220 M    170      144      116       91       77       73       70       60       56       46
0230 K              1
0240 Y                                 1
0250 1      1                                                 -1
0260 2             11.      22.      34.      45.      57.      68.      80.      92.     103.
0270 3   650.     850.    1230.    1731.    2314.    2976.    3707.    5022.    8236.   1361.0
0280 K     99
0290 A
00300 A
0310 A
OLD NY160SP
LNHFF
00100 A BROOKSIDE DAM
0110 A RESERVOIR ROUTING OF SPF OVER STRUCTURE
0120 A INCLUDES EMERGENCY SPILLWAY UPPER DIV LOWER DIV
0130 B     40        1
0140 1      3
0150 K
0160 M     -1            4.1
00170 M    20       31       54       99      158      214      246      328      402      763
0180 M   1260     1955     2635     3042     3000     2632     2175     1754     1416     1147
0190 M    920      747      596      474      377      301      240      192      154      124
0200 M    100       82       67       53       46       45       42       36       30       25
0210 K              1
0220 Y                                 1
0230 1      1                                                 -1
0240 2             11.      22.      33.      45.      56.      68.      80.      91.     103.
0250 3   650.     850.    1230.    1731.    2314.    2976.    3707.    5022.    8236.    1361.
0260 K     99
0270 A
0280 A
0290 A
0
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HEC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHANGE NO. 01
****

BROOKSIDE DAM
RESERVOIR ROUTING OF PMF OVER STRUCTURE
INCLUDES EMERGENCY SPILLWAY UPPPER DIV AND LOWER DEV

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
40	1	0	0	0	0	0	0	0	0

JOPER	NWT
3	0

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SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	4.10	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

54.	59.	107.	203.	327.	440.	545.	684.	900.	1530.
2500.	3037.	5140.	5918.	5028.	5103.	4196.	3357.	2683.	2149.
1721.	1374.	1092.	867.	689.	540.	436.	348.	270.	222.
178.	144.	116.	91.	77.	73.	70.	68.	56.	46.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5918.	5004.	2100.	1354.	54158.
INCHES		11.35	19.78	20.48	20.48
AC-FT		2482.	4326.	4478.	4478.

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HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE=	0.	11.	22.	34.	45.	57.	68.	80.	92.	103.
OUTFLOW=	650.	850.	1230.	1731.	2314.	2976.	3707.	5022.	8236.	1361.

TIME	EOP STOR	AVG IN	EOP OUT
1	25.	54.	54.
2	0.	57.	652.
3	-26.	83.	153.
4	-26.	155.	155.
5	-21.	265.	251.
6	-15.	300.	371.
7	-9.	497.	481.
8	-3.	615.	598.
9	8.	836.	807.
10	24.	1263.	1332.
11	44.	2019.	2239.
12	66.	3169.	3561.
13	76.	4409.	5163.
14	80.	5529.	5806.
15	81.	5873.	5925.
16	76.	5466.	5115.
17	71.	4650.	4296.
18	64.	3777.	3436.
19	54.	3020.	2834.
20	44.	2416.	2254.
21	36.	1935.	1816.
22	28.	1540.	1471.
23	20.	1233.	1176.
24	14.	900.	945.
25	7.	770.	776.
26	-1.	619.	630.
27	-7.	492.	510.
28	-13.	392.	406.
29	-17.	313.	324.
30	-21.	250.	259.
31	-23.	200.	207.
32	-26.	161.	167.
33	-27.	130.	135.
34	-29.	104.	107.
35	-30.	84.	87.
36	-30.	75.	76.
37	-31.	72.	72.
38	-31.	69.	69.
39	-31.	62.	63.
40	-32.	51.	52.
SUM			54842.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5925.	4970.	2170.	1371.	54842.
INCHES		11.29	19.77	20.74	20.74
AC-FT		2470.	4323.	4535.	4535.

********* ********* ********* ********* *********

RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	5918.	5004.	2100.	1354.	4.10
ROUTED TO	0	5925.	4970.	2170.	1371.	4.10

****
EC-1 VERSION DATED JAN 1973
PDATED AUG 74
HANGE NO. 01
****

BROOKSIDE DAM
RESERVOIR ROUTING OF SPF OVER STRUCTURE
INCLUDES EMERGENCY SPILLWAY UPPER DIV LOWER DIV

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
40	1	0	0	0	0	0	0	0	0

JOPER	NWT
3	0

**********   **********   **********   **********   **********

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	4.10	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

20.	31.	54.	990.	150.	214.	260.	328.	482.	763.
1260.	1955.	2635.	3042.	3000.	2632.	2175.	1754.	1416.	1147.
920.	747.	596.	474.	377.	301.	240.	192.	154.	124.
100.	82.	67.	53.	46.	45.	42.	36.	30.	25.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3042.	2573.	1161.	725.	28991.
INCHES		5.84	10.54	10.96	10.96
AC-FT		1277.	2305.	2397.	2397.

**********   **********   **********   **********   **********

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE=	0.	11.	22.	33.	45.	56.	68.	80.	91.	103.
OUTFLOW=	450.	850.	1230.	1731.	2314.	2976.	3707.	5022.	8236.	1361.

TIME	EOP STOR	AVG IN	EOP OUT
[illegible]	[illegible]	[illegible]	[illegible]

1	[illegible]	[illegible]	[illegible]
2	0.	30.	651.
3	-20.	43.	117.
4	-9.	522.	472.
5	-5.	574.	562.
6	-22.	186.	232.
7	-22.	237.	236.
8	-19.	294.	287.
9	-14.	405.	391.
10	-3.	623.	594.
11	15.	1012.	995.
12	34.	1600.	1766.
13	40.	2295.	2403.
14	56.	2839.	2990.
15	57.	3021.	3034.
16	52.	2816.	2723.
17	44.	2404.	2270.
18	36.	1965.	1862.
19	28.	1505.	1499.
20	21.	1202.	1219.
21	15.	1038.	1006.
22	9.	838.	821.
23	2.	672.	690.
24	-5.	535.	554.
25	-11.	426.	441.
26	-16.	339.	352.
27	-20.	271.	280.
28	-23.	216.	224.
29	-25.	173.	179.
30	-27.	139.	144.
31	-28.	116.	119.
32	-29.	95.	98.
33	-30.	75.	77.
34	-31.	60.	62.
35	-32.	50.	51.
36	-32.	46.	46.
37	-32.	44.	44.
38	-32.	39.	40.
39	-33.	33.	34.
40	-33.	28.	28.
SUM			29701.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3034.	2560.	1162.	743.	29701.
INCHES		5.81	10.55	11.23	11.23
AC-FT		1270.	2307.	2456.	2456.

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RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	3042.	2573.	1161.	725.	4.10
ROUTED TO	0	3034.	2560.	1162.		

APPENDIX D

REFERENCES

APPENDIX

REFERENCES

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